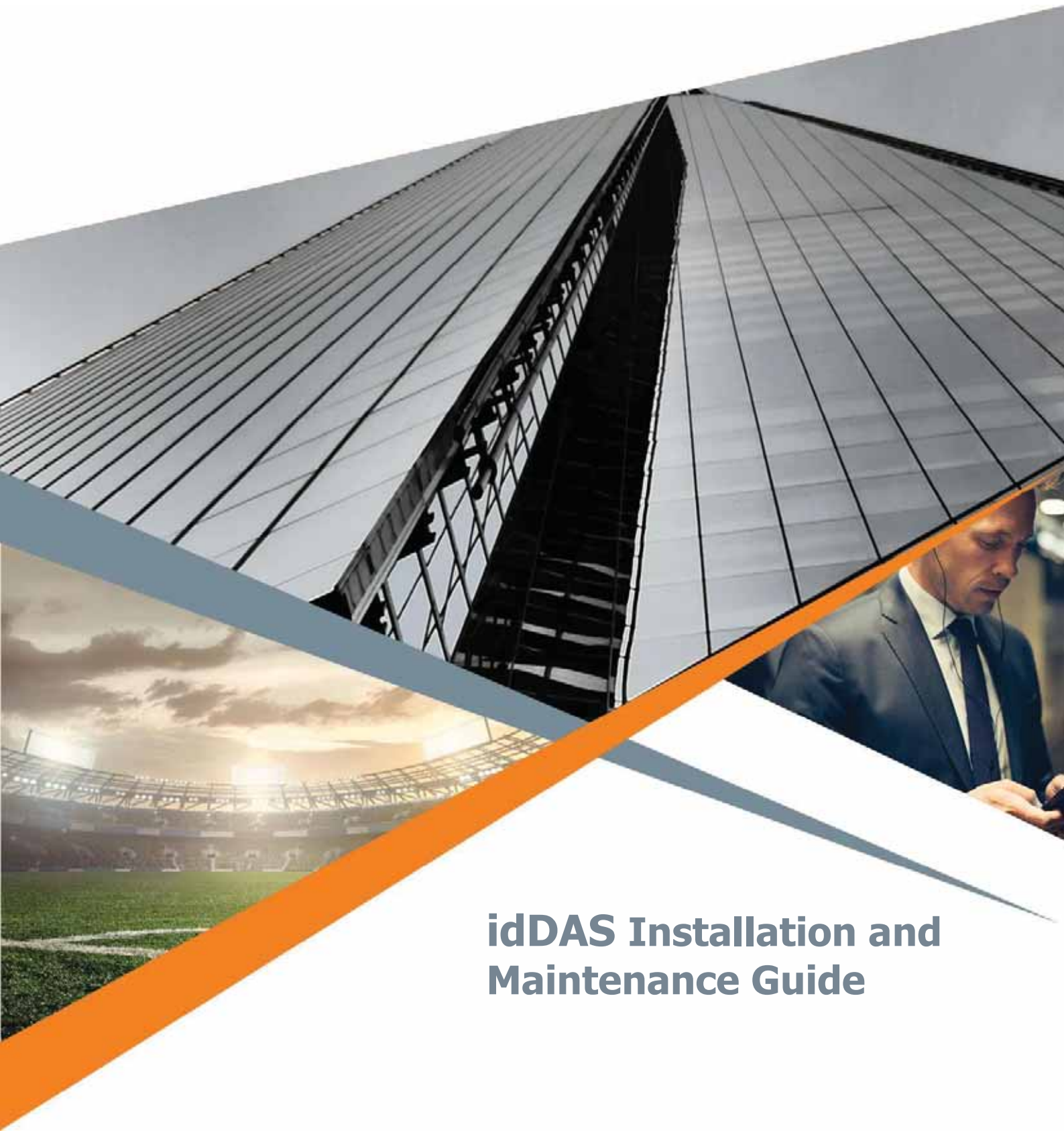
COBHAM



idDAS Installation and Maintenance Guide

Doc. No. 00109GU Rev. 2.0

Preface Material

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About this Manual and for whom it is Intended

This Installation Guide is intended for experienced technicians and engineers. It is assumed that the customers installing, operating, and maintaining Cobham Wireless equipment are familiar with the basic functionality of this type of equipment. It provides the following information:

- Description of the idDAS System Elements
- Installation requirements
- Procedures for installations of various configurations
- Maintenance procedures
- Specifications
- Ordering information

Revision History

REV	ECO	DETAILS
Rev. 1.3	C12145	• Maintenance procedures updates: MTDI chassis, idRU30, idRU40, MSDH, APOI, instructions for required web GUI operations • Updated APOI to MTDI connections • Updates on idRU external alarms connections • High Power idRU 1800 composite output power specs with and without GSM • Factory set static IP Address 192.168.1.253 • New Public safety idRU 30dBm • Ordering information updated and includes Eng. Numbers • Input for DC powered units =36 to 60V DC • Circuit breaker Type-C 10A required for idRU0036 • LEDs updated • Height dimension of MSDH for Americas PS DC = 350mm • RF source redundancy driven topology • Master Slave topology
2.0	C12559	• Full system redundancy updates and public safety alarms • RF exposure warning on minimum safe distance for the idRU 'id-DAS-RRU-3707-3708-PS-NFPA-DC'
		• Safe distance update for id-DAS-RRU-3604-PS-NFPA-AC, RRU0042

General Warnings

Required Permissions and Licenses

Prior to the use of this equipment, the user must ensure they have the permissions and licenses required for the intended transmissions.

Safety Instructions and Warnings

Throughout this manual, important safety warnings and admonishments are included to warn of possible hazards to persons or equipment. A safety warning identifies a possible hazard and then describes what may happen if the hazard is not avoided. The safety warnings – in the form of Dangers, Warnings and Cautions must be followed at all times. These warnings are flagged by the use of a warning icon, usually the triangular alert icon seen below. The exclamation point within the triangular alert icon is intended to warn the operator or service personnel of operation and maintenance from factors relating to the product and its operating environment, which could pose a safety hazard.

Guarantees

All antennas must be installed with lightning protection. Damage to power modules, as a result of lightning are not covered by the warranty.

Switching on AC or DC power prior to the connection of antenna cables is regarded as faulty installation procedure and therefore not covered by the Cobham Wireless warranty.

Repeater enclosures should be closed using the two screws. The screws must be fully tightened. Failure to do so may affect the IP66 compliancy and therefore any warranty.

Unauthorized Changes to Equipment

Changes or Modifications not expressly approved by Cobham Wireless could void the user's authority to operate the equipment.

Exclusive Remedies

The remedies provided herein are the Buyer's sole and exclusive remedies. Cobham Wireless shall not be viable for any direct, incidental, or consequential damages, whether based on contract, tort, or any legal theory.

idRU FCC Compliance

⚠ WARNING!!! This is NOT a CONSUMER device. This device is designed for installation by FCC LICENCEES and QUALIFIED INSTALLERS. You must have an FCC LICENCE or express consent of an FCC Licensee to operate this device.

Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

FCC Part 90 applicable only to 'id-DAS-RRU-3604-PS-NFPA-AC idRU'

FCC Part 90, applicable only to 'id-DAS-RRU-3604-PS-NFPA-AC idRU'

⚠ WARNING!!! This is NOT a CONSUMER device. This device is designed for installation by FCC LICENCEES and QUALIFIED INSTALLERS. You must have an FCC LICENCE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration.

Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

This booster must be operated as a Part 90 Class B booster. The installation procedure must result in the signal booster complying with FCC requirements 90.219(d). In order to meet FCC requirements **90.219(d),** it may be necessary for the installer to reduce the UL and/or DL output power for certain installations.

FCC Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Radio Frequency Interference (RFI)

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to RF reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the Donor antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

RF Safety

To comply with FCC RF exposure compliance requirement, adhere to the following warnings:

⚠ WARNINGS!

- Used only authorized and approved antennas, cables and/or coupling devices! The use of unapproved antennas, cables and or coupling devices could cause damage and may be a violation of FCC regulations. The use of unapproved antennas, cables and/or coupling devices is illegal under FCC regulations and may be subject to fines.
- Antennas used for this product must be fixed mounted on indoor permanent structures providing a separation distance as detailed in the following section.
- For frequency bands 379.5 MHz, 447.5 MHz, 796 MHz, and 2670 MHz, each individual antenna used for this transmitter must be installed to provide a minimum separation distance of 128 cm from all persons and must not be co-located with any other antennas for meeting RF exposure requirements.
- For frequency bands 728 MHz, 862 MHz, 1930 MHz, and 2110 MHz, each individual antenna used for this transmitter must be installed to provide a minimum separation distance of 186 cm from all persons and must not be co-located with any other antennas for meeting RF exposure requirements.
- For the id-DAS-RRU-3604-PS-NFPA-AC idRU each individual antenna used for this transmitter must be installed to provide a minimum separation distance of 25 cm from all persons and must not be co-located with any other antennas for meeting RF exposure requirements.
- The design of the antenna installation needs to be implemented in such a way as to ensure RF radiation safety levels and non-environmental pollution during operation.

idRU IC Compliance

⚠ WARNING!

This is NOT a CONSUMER device. This device is designed for installation by an installer approved by an ISED LICENCEE. You must have an ISED LICENCE or express consent of an ISED Licensee to operate this device.

⚠ *ATTENTION!*

Ce n'est pas un appareil consommateur. Cet appareil est conçu pour être installé par un installateur agréé par un licencié ISED. Vous devez avoir une licence ISED ou le consentement exprès d'un détenteur de licence ISED pour utiliser cet appareil.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance as stated below, between the radiator and your body.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Le présent appareil respecte les limites d'exemption de l'évaluation courante indiquées à la section 2.5.1 du CNR 102 et la conformité aux limites d'exposition humaine aux radiofréquences du CNR 102 ; les utilisateurs peuvent obtenir l'information canadienne sur l'exposition humaine aux radiofréquences et sur la conformité.

Cet émetteur ne doit pas être installé ni utilisé en conjonction avec une autre antenne ou un autre émetteur.

Cet équipement doit être installé et fonctionner en respectant la distance minimale indiquée ci-dessous, entre l'antenne et votre corps.

RF Exposure info

"The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Heath Canada's website www.hc-sc.gc.ca/rpb."

Class B Notice for Canada

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

⚠ WARNING!

This equipment complies with IC RSS-102, Safety Code 6 radiation exposure limits set forth for an uncontrolled environment. The minimum safe distance where RF exposure does not exceed IC permissible limit, is as follows for specific models:

* id-DAS-RRU-3707-3708-PS-NFPA-DC = 26 cm

* id-DAS-RRU-3604-PS-NFPA-AC = 32 cm.

⚠ ATTENTION!

Cet équipement est conforme à la norme CNR-102, les limites d'exposition aux rayonnements du Code de sécurité 6 établies pour un environnement non contrôlé. La distance minimale de sécurité où l'exposition aux RF ne dépasse pas la limite admissible IC, est la suivante pour des modèles spécifiques:

** id-DAS-RRU-3707-3708-PS-NFPA-DC = 26 cm*

** id-DAS-RRU-3604-PS-NFPA-AC = 32 cm*

Maximum Permissible Exposure (MPE) calculation for frequency bands

MPE calculation for 395MHz, 446MHz, 791MHz, 2540MHz

NOTE: Limits according to FCC.

The following calculations are used to estimate MPE distance for a single band and for multiple bands:

Parameters for calculation:

Pn = Maximum measured conducted power for each single path, 43.75 dBm = 23,714 mW

G = Maximum antennas gain (w/o cable loss) = 14dBi, 11dBi, 8dBi, 5dBi

Gn = Maximum antenna gain 13.617, 12.589, 6.309, 3.162 respectively as above

Sn = Power density limit [mW/cm2] per 47 CFR 1.1310 (B).

Rn = Minimum distance calculated

Equation for minimum distance for single band:

$$R_n = \sqrt{\frac{P_n G_n}{4\pi S_n}}$$

FREQ. BAND (MHZ)	PN OUTPUT POWER [MW]	SN POWER DENSITY LIMIT [MW/CM2]	RN MIN DIST. [CM] FOR ANT. GAIN 14DBI	RN MIN DIST. [CM] FOR ANT. GAIN 11DBI	RN MIN DIST. [CM] FOR ANT. GAIN 8DBI	RN MIN DIST. [CM] FOR ANT. GAIN 5DBI
395	3982	0.263	174	123	87	62.0
446	3982	0.297	164	116	82	58
791	10,000	0.527	195	138	98	69
2540	10,000	1	141.4	100.1	70.9	50.2

Minimum distance for single band

Equation for minimum distance for multiple bands:

$$\sqrt{R_1^{\,2} + R_2^{\,2} + R_3^{\,2} + \ldots + R_n^{\,2}} \quad < R$$

Worst case scenario when all bands are active.

ANTENNA GAIN	14dBi	11dBi	8dBi	5dBi
R- MINIMUM DISTANCE	339.39 cm	240.102 cm	170.07 cm	120.37 cm

Minimum distances for multiple bands for several antennas

MPE calculation for 728 MHz, 862 MHz, 1930 MHz, and 2110 MHz

INTERFACE	DESCRIPTION
Reference document	47 CFR & §1.1310 (B).
Limit	Frequency (MHz) PD(mW/cm2) 300 – 1500 S = f/1500 1550 – 100,000 S = 1
Calculation Result*:	Minimum distance in order to meet §1.1310= 524.37 cm

Combined Bands:

- Each idRU supports up to four bands that are combined in one PLEXER into one antenna port.
- Each band can transmit up to +43.75 dBm (23.714W).
- All four bands can transmit four times the power, +49.75dBm (94.856W).
- When more than one operator operates the band, the power budget is divided between the operators automatically. For example, when two operators using same band (different frequencies), each operator has a maximum output power of +40.75dBm (+43.75dBm / 2 = +40.75dBm).

Operation bands and frequencies

	DL START [MHZ]	DL STOP [MHZ]	DL CF [MHZ]	DL BW [MHZ]	POWER [DBM]
LTE 700	728	757	742.5	29	+43.75
CELL	862	894	878	32	+43.75
PCS	1930	1995	1962.5	65	+43.75
AWS	2110	2180	2145	70	+43.75

The following calculations are used to estimate MPE distance for a single band and for multiple bands:

Parameters for calculation:

Pn = Maximum measured conducted power for each single path, 43.75 dBm = 23,714 mW

G = Maximum antennas gain (w/o cable loss) = 14dBi, 11dBi, 8dBi, 5dBi

Gn = Maximum Antenna gain 13.617, 12.589, 6.309, 3.162 respectively as above

Sn = Power density limit [mW/cm2] per 47 CFR 1.1310 (B).

Rn = Minimum distance calculated

Equation for minimum distance for single band:

$$R_n = \sqrt{\frac{P_n G_n}{4\pi S_n}}$$

FREQ. BAND (MHZ)	PN OUTPUT POWER [MW]	SN POWER DENSITY LIMIT [MW/CM2]	RN MIN DIST. [CM] FOR ANT. GAIN 14DBI	RN MIN DIST. [CM] FOR ANT. GAIN 11DBI	RN MIN DIST. [CM] FOR ANT. GAIN 8DBI	RN MIN DIST. [CM] FOR ANT. GAIN 5DBI
728	23,714	0.4853	312.52	221.25	156.63	110.89
862	23,714	0.5747	287.20	203.32	143.94	101.90
1930	23,714	1	217.72	154.13	109.12	77.25
2110	23,714	1	217.72	154.13	109.12	77.25

Minimum distance for single band

Equation for minimum distance for multiple bands:

$$\sqrt{R_1^{\ 2} + R_2^{\ 2} + R_3^{\ 2} + \ldots + R_n^{\ 2}} \quad < R$$

Worst case scenario when all bands are active.

ANTENNA GAIN	14dBi	11dBi	8dBi	5dBi
R- MINIMUM DISTANCE	524.37 cm	371.22 cm	262.80 cm	186.05 cm

Minimum distances for multiple bands for several antennas

EMEA Standards

Safety:	EN 60950-1 EN 60825-1 EN 50385	General General General
EMC	EN 301 489-1 EN 301-489-5 EN 301 489-50	General UHF/TETRA Cellular
Radio	EN 303 609 EN 302 561 EN 301 908-1 EN 301 908-11 EN 301 908-15	GSM UHF/TETRA General 4G 3G 4G

Exposure to Electromagnetic Fields

Cobham Wireless Repeaters emit Radio Frequency signals which when connected to an antenna will produce an electromagnetic field. The International Commission for Non- Ionising Radiation Protection (ICNIRP)have issued guidelines that recommend the reference levels, which if adhered to, will provide maximum protection from adverse health effects that may be caused by exposure to such fields

This equipment when correctly installed and commissioned will be fully compliant with the ICNIRP reference levels.

ICNIRP produce two sets of reference levels, one for occupational exposure and one for general public exposure. The definition given of occupational exposure reference levels is that the individuals exposed will be aware of the potential hazards, be trained to recognize such hazards and be able to take corrective action if required. This might apply to trained RF engineers or antenna system installers but typically this equipment will be used in environments where persons not specifically trained will be exposed to electromagnetic fields generated by the equipment. Therefore it is recommended that when using this equipment the reference levels for exposure to the general public are used.

The reference levels are based on the Specific Energy Absorption Rate (SAR) that determines the heating effect a person may experience as a result of exposure to electromagnetic fields. The heating effect varies with the radio frequency as the SAR varies depending on the frequencies used.

The reference levels relevant to the frequencies used in this equipment are reproduced below:

The reference levels relevant to the frequencies used in this equipment are reproduced below:

FREQUENCY RANGE	E-FIELD STRENGTH ($V\ M^{-1}$)	H-FIELD STRENGTH ($V\ M^{-1}$)	B-FIELD (μT)	EQUIVALENT PLANE WAVE POWER DENSITY S_{EQ} (WM^{-2})
10 – 400 MHz	28	0.073	0.092	2
400 – 2,000 MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	$f/200$
2 – 300 GHz	61	0.16	0.20	10

The maximum recommended power density or field strength for typical Cobham Wireless repeaters would be as follows:

FM broadcast 100MHz	2W/m²
VHF 150MHz	2W/m²
TETRA 390MHz	2W/m²
UHF 460 MHz	2.3W/m²
900 MHz	4.5 W/m²
1800 MHz	9 W/m²
2100 MHz	10 W/m²
2600 MHz	10 W/m²

It should be noted that exposure to electromagnetic fields in excess of those stated above is not necessarily dangerous to the public but should such fields be present the installation should be investigated and action taken. This could be achieved by reducing the RF power delivered to the antenna or setting up exclusion zones either with physical separation or suitable signage.

To assist the designers of distributed antenna systems to ensure that when using Cobham Wireless repeater equipment their installations are compliant with the ICNIRP reference levels the following example provided.

To calculate the distance from the antenna where the reference level is reached the following formula is used.

$$r = \sqrt{\frac{PG}{4\pi Pd}}$$

P_{EIRP}	=	Effective Isotropic Radiated Power (watts)
P	=	Antenna input power (Watts)
G	=	Numeric antenna gain
Pd	=	Power density (W/m^2)
R	=	Distance

Assume LTE signals on a 900 MHz band of a total +10 dBm (10 mW) maximum composite power, connected to an indoor omnidirectional antenna with unity (0dBi) gain. Maximum power density is 4.5W/m²

$$r = \sqrt{\frac{0.01\dot{x}0}{4x3.142x4.5}} = 0.0133 \text{ metres or } 13.3\text{mm}$$

The construction of a typical indoor antenna includes a driven element and a plastic radome. The distance calculated is from the driven element so would therefore be within the dimensions of the radome making the antenna "touch safe".

Assume 2 x UMTS and 2 x LTE signals each with a maximum carrier power of +5 dBm (3.2mW) are connected to antenna with 3dBi gain The maximum permitted power density is 9 W/m^{-2}

$$r = \sqrt{\frac{4x0.00\dot{3}2x2}{4x3.142x9}} = 0.015\text{M or } 15\text{mm}$$

When making such calculations the number of carriers and the frequencies must be taken into account so that the composite power of all the carriers presented to an antenna are included in the calculation. Where higher powers are delivered to antennas that would cause the exclusion zone to exceed the dimensions of the radome the antenna must be located so that members of the public cannot approach closer than the calculated distance and warning notices for maintenance staff who may use ladders to approach the antenna are prominently displayed.

General Safety Warnings Concerning Use of System

Caution labels!	Throughout this manual, there are "Caution" warnings. "Caution" calls attention to a procedure or practice, which, if ignored, may result in injury or damage to the system, system component or even the user. Do not perform any procedure preceded by a "Caution" until the described conditions are fully understood and met.
Electrical Shock	DANGER! To prevent electrical shock when installing or modifying the system power wiring, disconnect the wiring at the power source before working with uninsulated wires or terminals. CAUTION! Some units may have more than one power cord. To reduce the risks of electric shock disconnect all power cords before servicing.
Caution: Installation Procedure	Installation should be done by qualified personal according to the NEC (National Electrical Code).
Attention: For OUTDOOR idRU Installations	**For Outdoor idRU (remote unit) installations:** • Installation should be done according to NFPA 780 or CAN/CSA-B72 • idRU equipment installed outdoors containing a power supply cord used in Wet Locations shall have the suffix "W", "W-A", or the words "water resistant" or "outdoor" marked on the flexible cord. • Installation of Surge Arrestors external to the equipment to reduce overvoltages or to bypass surge current shall be installed as per Eng. 280 of ANSI/NFPA 70. • Installation of Transient Voltages Surge Suppressors external to the equipment to reduce overvoltages or to bypass surge current shall be installed per Eng. 285 of ANSI/NFPA 70.
Caution: Safety to personnel	• Before installing or replacing any of the equipment, the entire manual should be read and understood. • The user needs to supply the appropriate AC or DC power to the repeater. Incorrect power settings can damage the repeater and may cause injury to the user. • Please be aware that the equipment may, during certain conditions become very warm and can cause minor injuries if handled without any protection, such as gloves.
Caution: Safety to equipment	• When installing, replacing or using this product, observe all safety precautions during handling and operation. Failure to comply with the following general safety precautions and with specific precautions described elsewhere in this manual violates the safety standards of the design, manufacture, and intended use of this product. • Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. • Cobham Wireless assumes no liability for the customer's failure to comply with these precautions. This entire manual should be read and understood before operating or maintaining the repeater.
Warning: Restricted Access Location	Access to the installation locations is restricted to SERVICE PERSONNEL.
Attention: Electrostatic Sensitivity	• Observe electrostatic precautionary procedures. • ESD = Electrostatic Discharge Sensitive Device. • Static electricity can be conducted to the semiconductor chip from the centre pin of the RF input connector, and through the AC connector pins. When unpacking and otherwise handling the repeater, follow ESD precautionary procedures including use of grounded wrist straps, grounded workbench surfaces, and grounded floor mats.

 **Caution: RF Exposure**	• RF radiation, arising from transmitter outputs connected to AWL's equipment, must be considered a safety hazard. • This condition might only occur in the event of cable disconnection, or because a 'spare' output has been left un-terminated. Either of these conditions would impair the system's efficiency. No investigation should be carried out until all RF power sources have been removed. This would always be a wise precaution, despite the severe mismatch between the impedance of an N type connector at 50 ohm, and that of free space at 377 ohm, which would severely compromise the efficient radiation of RF power. Radio frequency burns could also be a hazard, if any RF power carrying components were to be carelessly touched! • Antenna positions should be chosen to comply with requirements (both local & statutory) regarding exposure of personnel to RF radiation. When connected to an antenna, the unit is capable of producing RF field strengths, which may exceed guideline safe values especially if used with antennas having appreciable gain. In this regard the use of directional antennas with backscreens and a strict site rule that personnel must remain behind the screen while the RF power is on, is strongly recommended. • Where the equipment is used near power lines or in association with temporary masts not having lightning protection, the use of a safety earth connected to the case-earthing bolt is strongly advised.
 **Caution: Class 1 Laser**	The MSDH and idRU equipment described in this manual are equipped with class 1 lasers, which have been tested to meet IEC / EN 60825-1:2014 standards. Lasers should comply with CDRH to CFR 1040.10 and 1040.11 Exercise caution as follows: • Use of controls or adjustments or performances of procedures other than those specified herein may result in hazardous radiation exposure. • Do not stare into beam or view with optical instruments. Optical transmitters in the Fibre optic converter can send out high energy invisible laser radiation. There is a risk for permanent damage to the eye. • Always use protective cover on all unconnected cables and connectors. • Never look directly into a Fibre cable or a connector. • Consider that a Fibre can carry transmission in both directions. • During handling of laser cables or connections, ensure the source is switched off. • Regard all open connectors with respect and direct them in a safe direction and never towards a reflecting surface. Reflected laser radiation should be regarded as equally hazardous as direct radiation.
 **Battery Replacement and Disposal**	• The A-POI Controller module contains a button cell Renata CR1220 non-rechargeable Lithium battery. • The MSDH unit contains a button cell Panasonic Model BR1225A non-rechargeable Lithium battery. CAUTIONS! Risk of explosion of battery is replaced by incorrect type. Dispose of used batteries according to local laws and instructions.
 **Lifting and other Health and Safety Recommendations**	Certain items of Cobham Wireless equipment are heavy and care should be taken when lifting them by hand. Ensure that a suitable number of personnel, appropriate lifting apparatus and appropriate personal protective equipment is used especially when installing Equipment above ground e.g. on a mast or pole and manual handling precautions relevant to items of the weight of the equipment being worked on must be observed at all times when handling, installing or dismounting this equipment.
 **DC Blocks Required**	In some installations, under certain site conditions, it is required to add DC Blocks to the antenna cables of the remote units. For example, in installation locations with power cables that can induce currents resulting in trackside voltages or loop currents. In these type of situations, DC Blocks are required to protect the idDAS remotes from damage.

Sécurité générale concernant l'utilisation du système

 ***Lables Attention!***	*Tout au long de ce manuel , il y a des avertissements "Prudence." s "Prudence" attire l'attention sur une procédure ou pratique, qui , si elle est ignorée , peut entraîner des blessures ou des dommages au système, un composant du système ou même l'utilisateur.* *Ne pas effectuer toute procédure précédée d'une «Attention» jusqu'à ce que les conditions décrites sont parfaitement comprises et respectées .*
 **Choc Électrique**	DANGER! *Pour éviter un choc électrique lors de l'installation ou la modification du câblage d'alimentation du système, débrancher le câblage à la source d'alimentation avant de travailler avec des fils ou terminaux non isolés.* PRUDENCE! *Certaines unités peuvent avoir plus d'un cordon d'alimentation. Pour réduire les risques de déconnexion électrique de choc tous les cordons d'alimentation avant l'entretien.*
 ***Attention: Procédure d'installation***	*L'installation doit être effectuée par un personnel qualifié selon personnel au CEC (Code canadien de l'électricité)*

 ***Attention: pour les installations extérieures de idRU***	***Pour les installations extérieures de idRU***
	• *L'installation doit être effectuée conformément à la norme NFPA 780 ou CAN / CSA-B72*
	  • *Pour idRU qui est installé à l'extérieur, qui comprend un cordon d'alimentation utilisé dans les endroits humides, le suffixe "W", "W-A", ou les mots «résistant à l'eau» ou «extérieur» est marquée sur le cordon flexible.*
	  • *Surge Arrestors externe à l'équipement, qui sont utilisés pour réduire les surtensions ou de contourner courant de choc, doit être installé conformément à l'Eng. 280 de la norme ANSI / NFPA 70.*
	  • *Transient Voltages Parasurtenseur externe à l'équipement, qui sont utilisés pour réduire les surtensions ou de contourner les surtensions de courant, doit être installé conformément à l'Eng. 285 de la norme ANSI / NFPA 70.*

 ***Attention : la sécurité au personnel***	• *Avant d'installer ou de remplacer l'un des équipements , la totalité du manuel doit être lu et compris .* • *L'utilisateur doit fournir le courant alternatif approprié ou courant continu au répéteur . les paramètres d'alimentation incorrecte peut endommager le répéteur et peuvent causer des blessures à l'utilisateur.* • *S'il vous plaît être conscient que l'équipement peut , dans certaines conditions devenir très chaud et peut causer des blessures mineures en cas de manipulation sans protection , comme des gants .*
 ***Attention: la sécurité à l'équipement***	• *Lors de l'installation, de remplacement ou d'utiliser ce produit, respecter toutes les consignes de sécurité lors de la manipulation et de l'exploitation. Le non-respect des consignes de sécurité générales suivantes, et avec des précautions spécifiques décrites ailleurs dans ce manuel, viole les normes de la conception, la fabrication de sécurité, et l'utilisation de ce produit destiné.* • *Les changements ou modifications non expressément approuvés par la partie responsable de la conformité pourraient annuler l'autorité de l'utilisateur à utiliser l'équipement.* • *Cobham Wireless décline toute responsabilité pour l'échec du client de se conformer à ces précautions. L'ensemble de ce manuel doit être lu et compris avant d'utiliser ou de maintenir le répéteur.*
 ***Attention: Emplacement à accès restreint***	*Accès aux emplacements d'installation est limité au personnel de service.*

 ***Attention: exposition à RF***	• *Rayonnement RF qui découle de sorties du transmetteur connecté à l'équipement de AWL, doit être considéré comme un danger pour la sécurité.* • *Cette condition ne peut se produire en cas de déconnexion du câble, ou parce qu'une sortie 'supplémentaire' a été laissée non terminée. Chacune de ces conditions serait nuire à l'efficacité du système. Aucune investigation doit être effectuée jusqu'à ce que toutes les sources de puissance RF ont été enlevés. Ce serait toujours une sage précaution, malgré le grave déséquilibre entre l'impédance d'un connecteur de type-N à 50 ohms, et celle de l'espace libre à 377 ohms, ce qui serait compromettre gravement le rayonnement efficace de la puissance RF. brûlures de fréquence radio peuvent aussi être un danger, le cas échéant puissance RF portant des composants devait être négligemment touché!* • *Positions d'antenne doivent être choisis pour se conformer aux exigences (locales et statutaires) concernant l'exposition du personnel aux rayonnements RF. Lorsqu'il est connecté à une antenne, l'appareil est capable de produire des intensités de champ RF, qui peuvent dépasser les valeurs indicatives de sécurité en particulier si elle est utilisée avec des antennes ayant un gain appréciable. À cet égard, l'utilisation d'antennes directionnelles avec backscreens et une règle stricte du site que le personnel doit rester derrière l'écran tandis que la puissance RF est allumé, est fortement recommandé.* • *Si l'équipement est utilisé près des lignes électriques ou en association avec des mâts temporaires ne pas avoir une protection contre la foudre, l'utilisation d'une terre de sécurité relié au boulon de cas mise à la terre est fortement conseillé.*
 **Attention:** **sensibles aux décharges électrostatiques**	• Respecter les procédures de précaution électrostatiques. • ESD = décharges électrostatiques Sensitive Device. • L'électricité statique peut être conduit à la puce à semi-conducteur, à partir de la epingle central du connecteur d'entrée RF et à travers les epingle du connecteur à courant alternatif. • Lors du déballage et de toute autre manipulation du répéteur, suivre les procédures de précaution ESD y compris l'utilisation de poignet mis à la terre, des surfaces d'établi mis à la terre, et mat tapis à la terre.
 **Attention: laser de classe 1**	*L'équipement MSDH et idRU décrit dans ce manuel sont équipés de classe 1 lasers, qui ont été testés pour répondre aux normes IEC / EN 60825-1: 2014.* *Lasers doivent être conformes aux CDRH CFR 1040.10 et 1040.11* ***Faites preuve de prudence comme suit:*** • *L'utilisation de commandes ou de réglages ou l'exécution de procédures autres que celles spécifiées dans le présent document peuvent entraîner une exposition à des radiations dangereuses.* • *Ne pas regarder le faisceau ou la vue avec des instruments optiques. émetteurs optiques dans le convertisseur optique de fibre peuvent envoyer de haute énergie, invisible, le rayonnement laser. Il y a un risque de dommages permanents à l'œil.* • *Toujours utiliser la couverture de protection sur tous les câbles et connecteurs qui ne sont pas connectés.* • *Ne regardez jamais directement dans un câble de fibre ou d'un connecteur.* • *Considérer qu'une fibre peut transmettre dans les deux sens.* • *Pendant la manipulation des câbles laser ou des connexions, assurez-vous que la source est coupée.* • *Regard connecteurs tous ouverts avec respect et les diriger dans une direction sûre et jamais vers une surface réfléchissante. rayonnement laser Réfléchie doit être considérée comme tout aussi dangereux que le rayonnement direct.*

⚠ ***Changement de piles et élimination***	• *Le module A-POI Controller contient une pile bouton Renata CR1220 Pile au lithium non rechargeables.* • *L'unité MSDH contient une pile bouton Panasonic Modèle BR1225A de la batterie au lithium non rechargeable.* PRECAUTIONS ! • *Risque d'explosion de la batterie est remplacée par type incorrect.* • *Jetez les piles usagées conformément aux lois et instructions locales*
⚠ ***Levage et autres recommandations sur la santé et la sécurité***	• *Certains Eng.s de l'équipement Cobham Wireless sont lourds et il faut prendre soin de les soulever à la main.* • *Assurez-vous qu'un nombre suffisant de personnel, des appareils de levage appropriés et un équipement de protection individuelle approprié sont utilisés surtout lors de l'installation de l'équipement au-dessus de la terre, par exemple Sur un mât ou un poteau. En outre, les précautions manuelles de manipulation qui sont pertinentes pour les Eng.s du poids de l'équipement en cours de travail doivent être respectées en tout temps lors de la manipulation, de l'installation ou du démontage de cet équipement.*
⚠ ***Blocs DC Requis***	*Dans certaines installations, dans certaines conditions de site, il est nécessaire d'ajouter des blocs DC aux câbles d'antenne des répéteurs. Par exemple, dans les emplacements d'installation avec des câbles d'alimentation qui peuvent induire des courants entraînant des tensions de voie ou des courants de boucle. Dans ce type de situations, les blocs DC sont nécessaires pour protéger les répéteurs idDAS contre les dommages.*

Table of Contents

1 idDAS System Description

This chapter provides the following information

- Introduction to the idDAS system
- Features of the idDAS system
- idDAS for public safety
- idDAS architecture
- Detailed descriptions of each element, including power consumption and interfaces

1.1 About the idDAS System

Cobham Wireless idDAS provides a customizable and expandable cellular and data coverage solution for multiple operators and services over a common infrastructure. This is implemented via an all digital transport CPRI-based DAS. Supported RF sources inlcude macro and low power BTS devices, and small cells.

Analogue RF services and sectors from the RF source are conditioned, digitized and then transported utilizing CPRI links over SMF, MMF, Cat 6 cable infrastructure to remote locations. Cellular services are converged with WiFi and small cells' IP backhaul for distribution over the same CPRI link infrastructure.

An intuitive, web-based software management application is used for single-source management of all system elements by opening a web session to any of the system's digital central switching hubs (MSDHs).

The solution can be expanded and customized according to changing coverage and capacity needs. Cobham Wireless can provide a complete solution including design, site surveys and equipment related to the idDAS.

1.1.1 Physical Features

- All digital transport CPRI-based DAS
- Inherent and simple MIMO capability over a single backbone - lowers costs and simplifies deployment
- Robust low noise, high dynamic range architecture
- Software-controlled dynamic capacity management
- 8 frequency bands and more over the same F/O cable
- Cable agnostic - supports SMF and MMF
- Plug-and-play capability
- Modular mixable and expandable architecture
- Cobham Wireless patented DSP RF filtering technology
- Embedded "last mile" 1 Gbit/s IP backhaul for WiFi AP and Small cell
- Ready for direct CPRI base band interface
- Active Element Manager (AEM) monitor and supervision software

1.1.2 idDAS for Public Safety

idDAS supports families of products specifically designed for to meet rigid public safety requirements as required in various regions.

idDAS public safety for **North America (US and Canada)** products meet the requirements as follows:

- The enclosures are painted ~~a~~ Fire Life Safety Red
- Compliance to NEMA4
- Support for dry contact alarms in accordance with UL 2524 'Standard for In-building 2-Way Emergency Radio Communication Enhancement Systems' sections 12 & 33, in line with NFPA 72 'National Fire Alarm and Signalling Code'
- Compliance to Multiple Public Safety Standard –APCO P25 phase 1 and 2, TETRA, TETRAPOL, SMR, ESMR, LTE
- Support for custom redundancy options

idDAS public safety for **EU/EMEA** products meet the requirements as follows:

- The enclosures are painted a Fire Life Safety Red
- Meet the requirements of IP66
- Compliance to Multiple Public Safety Standard TETRA, TETRAPOL, LTE
- Support for custom redundancy options

Figure 1-1 illustrates a PS NFPA idRU identified by the red enclosure. Refer to Section 8.2.1.4 for part numbers.

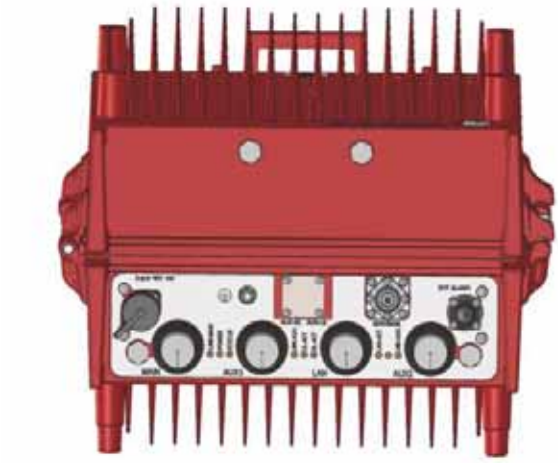

Figure 1-1. PS NFPA idRU Front Panel Example

1.2 Architecture

The idDAS solution consists of the following main elements – refer to Figure 1-2:

- **APOI** — Active Point of Interface. A headend service conditioning unit that supports up to 16 BTS sectors (+30dBm max input power) via up to eight, modular plug in band specific modules. See Section 1.3.1 for A-POI interfaces.

  NOTE: Some Public Safety installations include POI instead of APOI equipment.

- **MTDI** — Multi-Technology Digital Interface. Digitizes and filters RF signals from APOI (up to 16 channels) or POI (up to 8 channels) sources via four band specific plug-in modules covering all common frequencies. See Section 1.3.2 for MTDI interfaces.
- **MSDH** — Multi-Sector Digital Hub. Serves as the central switching hub and control system of the idDAS. All digitized cellular resources converge at the MSDH through CPRI links and are then distributed to the relevant remote units. Two MSDH models are available: Master MSDH and Slave MSDH. Management is implemented via the Master MSDH. A Master and a Slave unit can be cascaded for single source management of the remote units connected to both. See Section 1.3.3 for MSDH interfaces.
- **idRU** — idDAS Remote Unit. IP66 outdoor unit with four band support. A range of models are available for medium power (32dBm per band) and high (40dBm per band). The idRU serve as the backhaul port for any IP device or switch in the neighborhood, distributing combined cellular and data services. See Section 1.3.4 for idRU interfaces.
- **Management —** all idDAS system elements are managed via a web session to the Main MSDH unit.

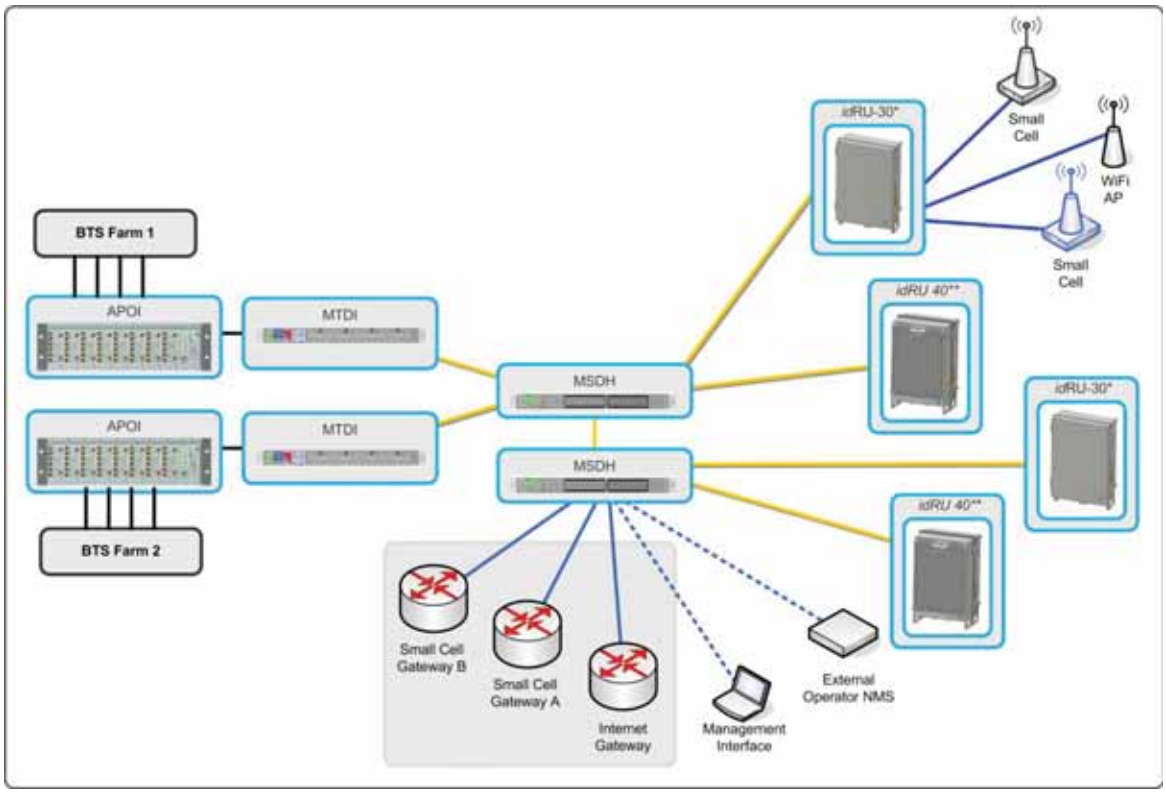

Figure 1-2. idDAS System Architecture

* idRU 30 = idRU Medium Power

** idRU 40 = idRU High Power

1.3 Elements Interfaces and Power Feed

This section describes the interfaces and power feed of the A-POI, MTDI, MSDH, and idRU.

1.3.1 A-POI Description

The A-POI (Active Point of Interface) conditions and controls the level of up to 16 low power BTS sectors via band dedicated conditioning modules. All A-POI modules and interfaces are located on the front panel. The power connections for both AC and DC models are located on the rear panel.

NOTE: A-POI RF modules support a maximum power of 30dBm. Low PIM attenuation is required for BTS signals whose power level exceeds 30dBm.

1.3.1.1 APOI Modules

As illustrated in Figure 1-3, the APOI front panel supports the following modules: BTS Interface (BTSI) modules, a Control module and a Display and Switch module. The modules are described in Table 1-1.

Figure 1-3. APOI Modules

Each BTSI module supports two channels with dedicated BTS and MTDI interfaces as illustrated below.

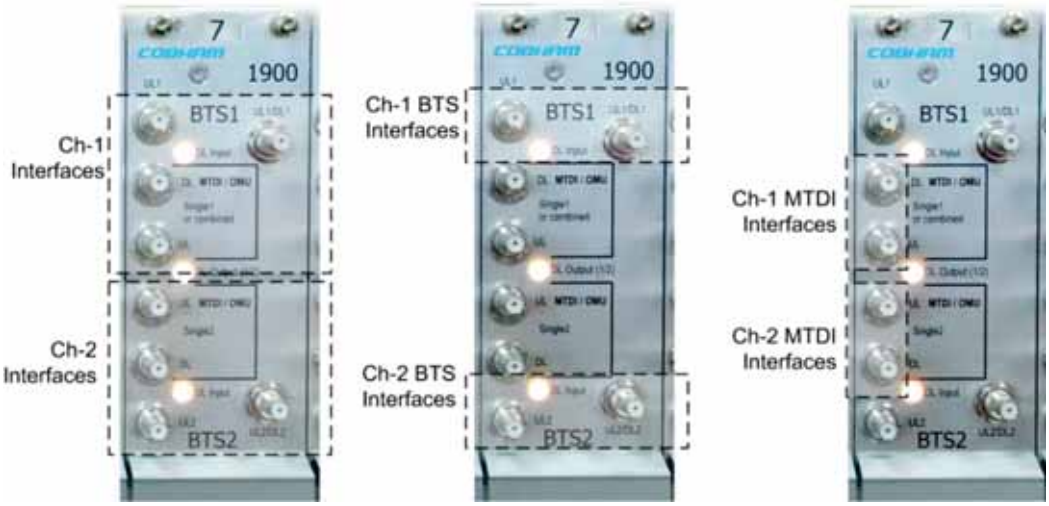

Figure 1-4. BTSI Interfaces per Channel

Table 1-1. APOI Modules Descriptions

BTSI MODULES	DESCRIPTION
BTSI RF Interfaces	Up to eight hot-swappable band-specific conditioning modules that provides BTS to MTDI interfaces. Each module supports two same-band channels of up to 30dBm. • BTS side – simplex and duplex connections • MTDI side – simplex only. • RF interfaces – four QMA female connectors per sector: two BTS and two MTDI. • BTS connections per sector – UL/DL QMA is a double purpose port used for BTS UL simplex connections and for BTS duplex connections • For single converged output (software configured), only the top sector interfaces are connected. *Combined sectors are of the same band but cannot be the same frequencies.*
BTSI Module LEDs	DL Input: Status of input from the RF source: • Green – normal operation • Orange – BTS power is lower than valid minimum input power • Orange blinking – either in Test mode or RF is OFF DL Output 1/2: Status of output towards BTS: • Green – normal operation • Red (steady or blinking) – Major fault The output power from either channel exceeds the power limit set in Manual mode. • Orange linking – either in Test mode or RF is OFF
CONTROL MODULE	**DESCRIPTION**
Control Module Interfaces and LEDs	• Implements the APOI control and management capabilities. • The **Control** module **Eth** port must be connected to (any) one of the Ethernet ports on the **Display and Switch** module. • CCD status LED – Green blinking indicates normal operation.
DISPLAY AND SWITCH MODULE	**DESCRIPTION**
Display and Switch Module Interfaces	• Provides identification, as well and management connection to MTDI. • RJ-45 ports – four identical ports One of the ports is connected to the **Control** module **Eth** port, and another to the **APOI MNG** port on the relevant **MTDI** unit.

1.3.1.2 A-POI Power Feed and Grounding

This section details the APOI power feed requirements for 100-240VAC and 48V DC. For bespoke applications feed, refer to Section 1.4.1.

AC Feed

APOI AC Power feed 100-240V~ 50/60Hz, 1A Max

Connect BOTH power connectors.

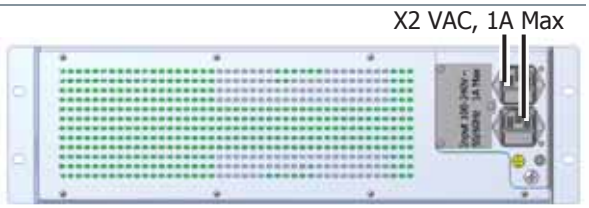

Figure 1-5. APOI AC Power Feed

48V DC

Figure 1-6. APOI 48V DC Power Feed

Equipment DC Power Feeding: 48V DC, 2A max

Power Interface Pins (numbered from left to right):

Pin 1,2 Positive (+)

Pin 3,4 Negative (-)

For -48V DC Feeding:

- Connect Pin 1,2 to RTN (0V)
- Connect Pin 3,4 to -48V DC

Terminal Connector specification:

Nominal current: 8A, Rated voltage 160 V

1.3.2 MTDI Description

The MTDI (Multi Technology Digital Interface) unit digitizes and filters up to 16 conditioned RF sectors from one or more A-POI shelves, or up to 8 sectors from POI interfaces. The filtered signals are combined and routed over a single CPRI link (SM or MM) towards the MSDH. Signal digitization is implemented via four, band specific dual-channel modules. The MTDI is managed via the MSDH.

1.3.2.1 MTDI Front Panel Elements

The MTDI front panel includes the digitization modules, CPRI interfaces, APOI interfaces and service ports. The front panel also includes the power feed of DC MTDI models. The power feed of AC MTDI models is located on the rear panel.

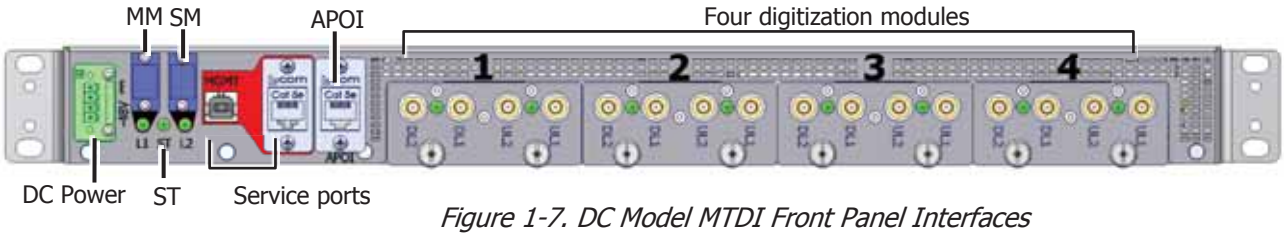

Figure 1-7. DC Model MTDI Front Panel Interfaces

Table 1-2. MTDI Front Panel Elements

ELEMENT	DESCRIPTION
DC Power connector	48V DC input for DC models. Power connections are described in section 1.3.2.2.
L1/L2 interface	Two integrated CPRI SFPs – L1 (MM), L2 (SM), each with a dedicated LED. • L1 SFP = Multimode SFP+ Transceiver 850nm 400m 10Gb MM LC L1 LED = Red flash every 10sec indicates SFP self-test OK • L2 SFP = Single Mode SFP+ Transceiver 1310nm 10 km 10Gb SM LC L2 LED = Fast blinking green – link is connected Slow blinking green – no link NOTE: Connect either L1 or L2 – NOT both. Connect L2 to the UPPER interface only.
ST LED	System Test LED – a very slow blinking green indicates system self-test is OK.
A-POI Port	Connected to any Ethernet port on the **Switch and Display** module on the **APOI**; enables the APOI to be managed via an MSDH session.
LAN and MGMT	Service access ports.
RF digitization module	Four service specific, dual-channel RF digitization modules. • RF connections – two pairs of UL/DL QMA simplex connections to A-POI RF modules of the *same band.* • Connections can be to the same RF module on the APOI or to two modules with converged sectors. • The digitized services are combined towards the connected L1 or L2 CPRI port (only one port is relevant). • LED – green flash every 4sec indicates RF board self-test OK

1.3.2.2 MTDI Power Feed

The section describes the power feed options for 100-240VAC or 48V DC. For bespoke 12V DC feed, refer to Section 1.4.2).

MTDI AC Feed

AC Power feed 100-240V~ 50/60Hz, 2A Max

AC feed models support a *single* ground lug located on the rear panel. The

Figure 1-8. MTDI/MSDH VAC Feed

MTDI 48V DC Feed

Equipment DC Power Feeding: 48V DC, 3A max

Power Interface Pins (numbered from left to right):

Pin 1,2 Positive (+)

Pin 3,4 Negative (-)

For -48V DC Feeding:

- Connect Pin 1,2 to RTN (0V)
- Connect Pin 3,4 to -48V DC

Terminal Connector specification:

Nominal current: 8A, Rated voltage 160 V

Figure 1-9. MTDI 48V DC Power Feed

Note the following:

- The ground lugs are M4.
- DC feed models support two ground lugs located on either side of the rear panel (for convenience). It is required to connect only *one* ground lug.
- Some bespoke MSDH models may include a Sync interface for future applications instead of a second ground lug on the rear panel. The Sync interface is not currently applicable.

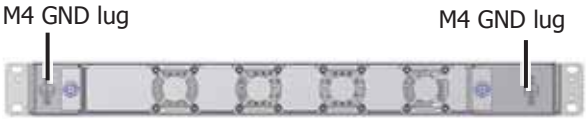

Figure 1-10. MTDI DC Rear Panel

1.3.2.3 MTDI Fan Module

The MTDI supports a replaceable fan module that can be accessed from the rear panel. For instructions on replacing the fan module, refer to section 6.6.3. The fan module and the replacement instructions are identical for the MSDH and for the MTDI and are only described in dedicated sections for clarity.

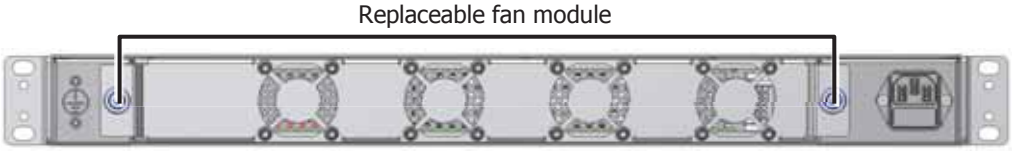

Figure 1-11. MSDH/MTDI Fan Module

1.3.3 MSDH Description

The MSDH (Multi Sector Digital Hub) serves as the idDAS central switching hub and control system. It routes digitized cellular resources received from MTDI units along with data from the Ethernet backbone to the connected idRUs. All resources are routed over CPRI connections.

Note the following:

- The MSDH supports 16 CPRI interfaces and 16 Ethernet backhaul ports.
- Each MSDH supports connection to a single additional MSDH via one of the CPRI ports.
- Each MSDH supports connections to a number of MTDI and idRUs according to the limitations of the topology and ranges of the SFPs.
- Data from any backhaul port that is connected to a router is forwarded to the idRU connected to the parallel CPRI port: e.g. ETH-1to CPRI-1, ETH-2 to CPRI-2, etc.

NOTE: MSDH PS supports a dry contact output alarm on the rear panel.

1.3.3.1 MSDH Front Panel Elements

The MSDH front panel contains all the management and communication interfaces. The power feed location is model dependent.

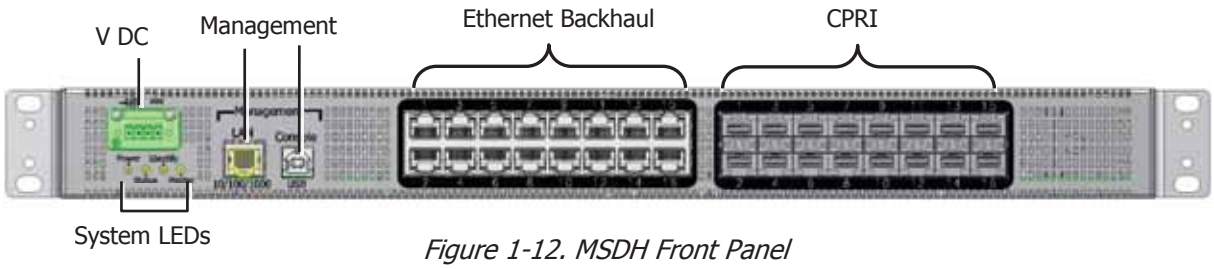

Figure 1-12. MSDH Front Panel

Table 1-3. MSDH Front Panel Elements

INTERFACE	DESCRIPTION
DC Power	Relevant only to DC models. AC models power connector is located on the rear panel. See Section 1.3.3.2.)

CPRI Ports	• Interfaces – 16 CPRI ports providing interface to MTDIs, idRUs or to another MSDH unit in Master Slave configuration (Section 2.3):
	  • Up to 16 standard range (10 km or below)
	  • Up to 8 long range (above 10Km) + up to 8 standard range (10 km or below)
	  • Supported SFPs – Cobham Wireless SFP+ plug-in interfaces (ordered separately).
	• Connections – For order and intuitive identification, it is recommended to connect the relevant MTDI and MSDH units to lower numbered ports (1, 2, 3, etc.), and the idRUs to higher numbered ports.
	• SFP LEDs – all SFP LEDs flash every few seconds as self-test is performed. One of the four LEDs indicates link status as follows:
	  • Steady green – link identified and operational
	  • Slow blinking green – searching for link

Ethernet Backhaul Ports	• 16 RJ-45 ports for Gigabit Ethernet connections • 1 Gbps IP Backhaul per port • Connected ports route the data to the parallel CPRI port.

INTERFACE	DESCRIPTION
LAN port	Ethernet management.
Console port	Serves as an additional local setup port. This is useful if the LAN port is already connected to the network.
System LEDs	• Power and Master – steady green • Identify and Status – off • All LEDs flash every ~12sec. • Identify function – When the *Identify* function is activated in the GUI, all LEDs of the relevant MSDH unit blink very quickly.

1.3.3.2 MSDH Power Feed

The section describes the power feed options for 100-240VAC or 48V DC. For bespoke 12V DC power feed, refer to Section 1.4.3).

MSDH AC Feed

AC Power feed 100-240V~ 50/60Hz, 2A Max

Figure 1-13. MSDH VAC Feed

MSDH 48V DC Feed

Equipment DC Power Feeding: 48V DC, 3A max/feed

Power Interface Pins (numbered from left to right):

Pin 1,2 Positive (+)

Pin 3,4 Negative (-)

For -48V DC Feeding:

- Connect Pin 1,2 to RTN (0V)
- Connect Pin 3,4 to -48V DC

Terminal Connector specification:

Nominal current: 8A, Rated voltage 160 V

Note the following:

- The ground lugs are M4.
- DC feed models support two ground lugs located on either side of the rear panel (for convenience). It is required to connect only *one* ground lug.

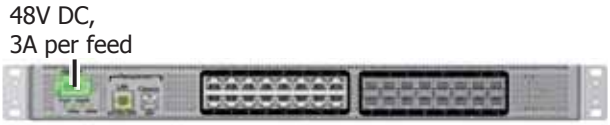

Figure 1-14. MSDH 48V DC Power Feed

Figure 1-15. MSDH DC Rear Panel

1.3.3.3 MSDH Fan Module

The MSDH supports a replaceable fan module that can be accessed from the rear panel. For instructions on replacing the fan module, refer to section 6.6.3. The fan module and the replacement instructions are identical for the MSDH and for the MTDI and are only described in dedicated sections for clarity.

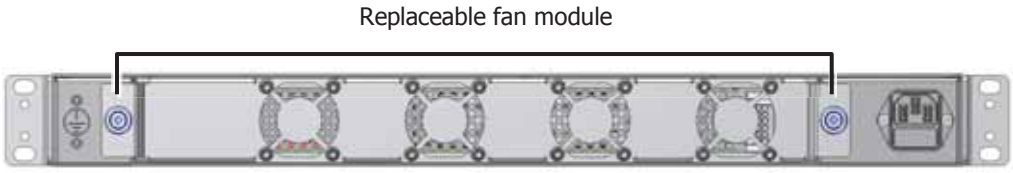

Figure 1-16. MSDH/MTDI Fan Module

1.3.3.4 MSDH PS NFPA Dry-Contact Output Alarm

MSDH PS NFPA supports a 4-pin circular binder-type alarms connector on its rear panel for the implementation of an output dry-contact alarm. The alarm connections are described in Section 4.4.4.

Figure 1-17 MSDH Public Safety Rear Panel

1.3.4 idRU Interfaces

A range of idRU 30 medium power, idRU 40 high power, and PS NFPA idRU models are available. The interfaces of the models may vary according to the required connections.

NOTE: idRU high power units require a fan-hood assembly for additional cooling.

1.3.4.1 idRU Enclosures

Following are illustrations of the idRU enclosures.

idRU Medium Power *idRU High Power* *Public Safety idRU*

Figure 1-18. idRU Chassis Types

The repeater model and serial number are displayed on the external label as illustrated in Figure 1-19.

Figure 1-19. Repeater Identification Label

1.3.4.2 idRU Front Panel Elements

The interface panels of idRU models may differ according to the number of antenna ports and other criteria. Figure 1-20 provides a typical example of a medium power idRU.

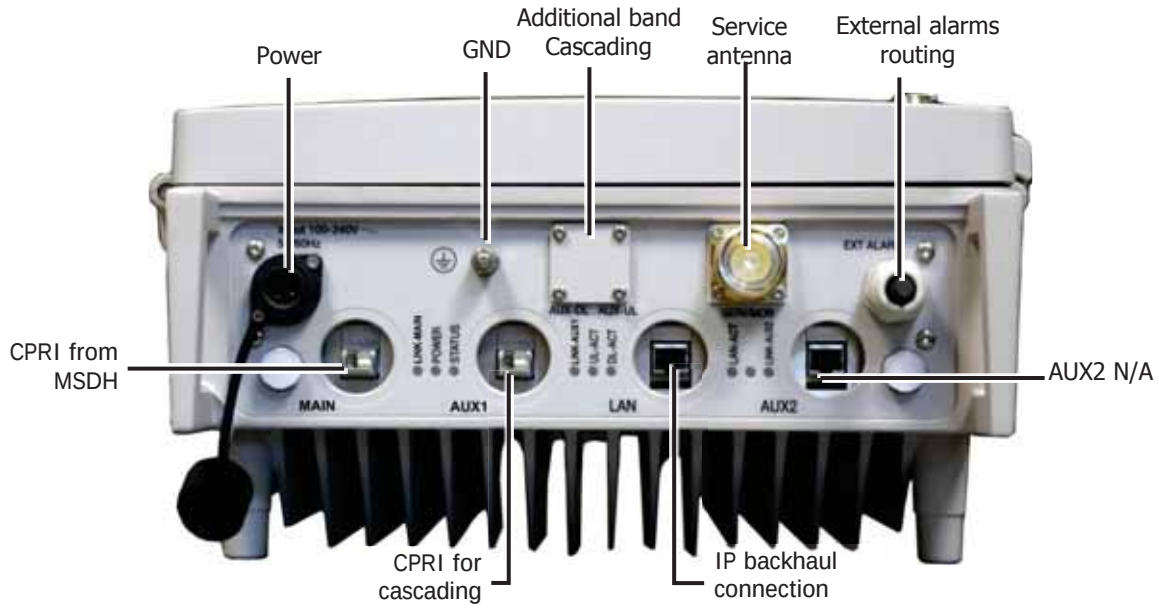

Figure 1-20. Example of an idRU Medium Power Panel

INTERFACE	DESCRIPTION
Power	Power feed: 100-240V~ 50/60Hz, or 48V DC
MAIN	CPRI interfaces towards MSDH. Use Cobham Wireless SFP+ plug-in interfaces (ordered separately). Be sure to match the SFP used in the corresponding MSDH port.
AUX1	CPRI interfaces for cascading idRU units by interconnecting their MAIN and AUX-1 ports. Use Cobham Wireless SFP+ plug-in interfaces (ordered separately).
SERVICE	Mobile antenna connection, where the interface differs according to idRU type: • idRU-30: 7/16 DIN RF connector • idRU-40: 4.3-10 RF connector
LAN	RJ45 Ethernet port for IP backhaul connection.
EXT ALARMS	• An aperture used for routing up to four external alarms internally to the repeater where they are connected. This requires opening the repeater door. Detailed in Section 5.7.1. • idRU models that include a Fan-hood assembly support up to three external alarms. The fourth external alarm provides fan-hood monitoring.
AUX2	N/A (Future Option).

NOTE: idRU LEDs currently not applicable.

1.3.4.3 idRU PS NFPA Front Panel Elements

The interface panels of idRU Public Safety NFPA models are similar to the standard idRU interfaces described in Section 1.3.4.2 with two differences:

- The red enclosure
- The External Alarms of some PS NFPA models are connected via a Binder-type connector and the alarms pin-out differs from the pin-out of standard repeaters

Figure 1-21 provides a typical example of a PS NFPA idRU.

⚠ ATTENTION! In order to fully comply with NEMA-4, and IP66 for ROW, the LAN and each of the CPRI CPRI interfaces must be protected from moisture by using tubing and a seal. Refer to Section 3.2.1 tubing and seal details.

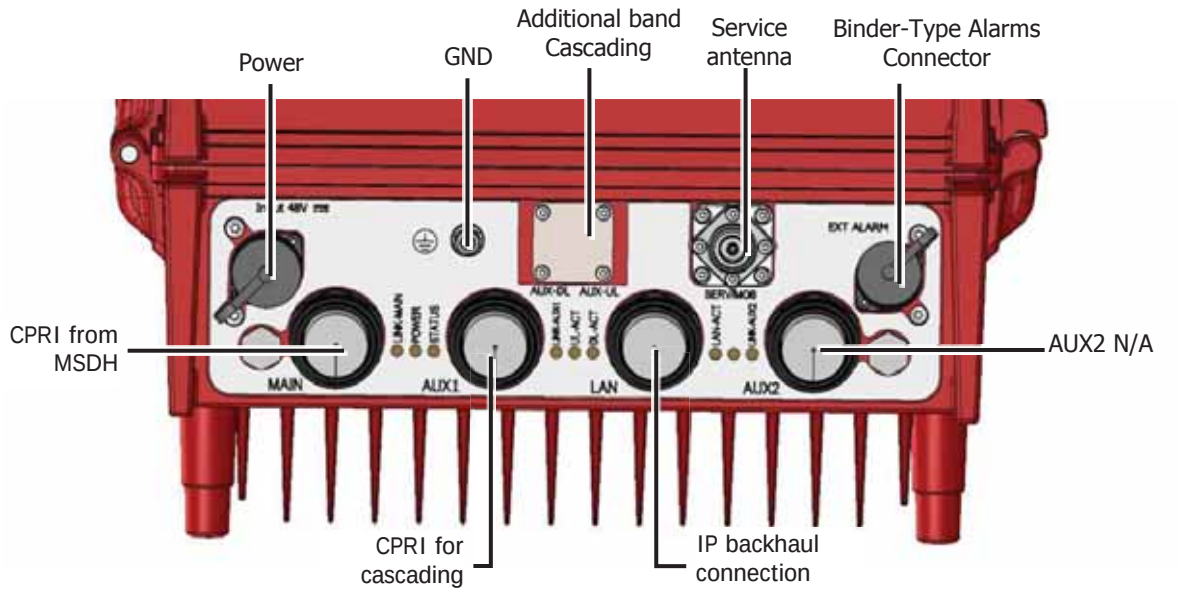

Figure 1-21. Example of an idRU Public Safety NFPA Front Panel

1.4 Bespoke 12V DC Headend Elements

This section describes the bespoke headend elements supporting an external 12V DC power source: APOI, MTDI, and MSDH. Aside from the 12V DC power source, the interfaces and operation of these elements are identical to the standard elements as described in Section 1.3.

1.4.1 12V DC APOI Power Feed

12V DC Feed

Equipment DC Power Feeding: 12V DC, 3A max/feed
Power Interface Pins (numbered from left to right):
Pin 1,2 Positive (+)
Pin 3,4 Negative (-)

For 12V DC Feeding:
- Connect Pin 1,2 to 12V DC
- Connect Pin 3,4 to RTN (0V)

Terminal Connector specification:
Nominal current: 8A, Rated voltage 160V

⚠ Be sure the power input does not exceed 12V DC.

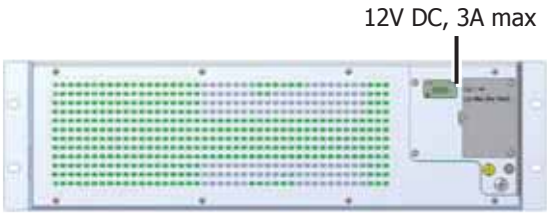

Figure 1-22. APOI 12V DC Power Feed Rear Panel

1.4.2 12V DC MTDI Power Feed

MTDI 12V DC Feed

Equipment DC Power Feeding:
MTDI: 12V DC, 10A max
Power Interface Pins (numbered from left to right):
Pin 1,2 Positive (+)
Pin 3,4 Negative (-)

For 12V DC Feeding:
- Connect Pin 1,2 to 12V DC
- Connect Pin 3,4 to RTN (0V)

Terminal Connector specification:
Nominal current: 8A, Rated voltage 160 V

⚠ ATTENTION! Be sure the power input does not exceed 12V DC.

Figure 1-23. MTDI 12V DC Power Feed

1.4.3 12V DC MSDH Power Feed

MSDH 12V DC Feed

Equipment DC Power Feeding:
12V DC, 12A max
Power Interface Pins (numbered from left to right):
Pin 1,2 Positive (+)
Pin 3,4 Negative (-)

For 12V DC Feeding:
- Connect Pin 1,2 to 12V DC
- Connect Pin 3,4 to RTN (0V)

Terminal Connector specification:
Nominal current: 8A, Rated voltage 160 V

⚠ ATTENTION! Be sure the power input does not exceed 12V DC

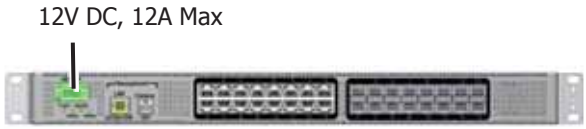

Figure 1-24. MSDH 12V DC Power Feed

2 Topology Examples

This chapter provides examples of the following types of topologies and applications

- Basic topology
- Cascaded idRUs
- Master Slave topologies
- Redundancy driven topologies – RF source and dual-system redundancy driven topologies
- Special applications such as single CPRI link, idDAS for Australia, and WCS applications.

NOTE: Additional topologies are supported. Each type of topology requires the appropriate setup and configuration procedures.

2.1 Basic Topology

This overview of a basic topology is designed to provide better understand the interoperation of the idDAS elements. The basic topology consists of the following elements:

- 1x APOI – conditions up to 16 RF sectors
- 1x MTDI – performs RF to optic conversion for up to 16 conditioned RF band sectors
- 1x MSDH – routes the RF bands from the MTDI, towards up to 15 connected remotes. Ethernet backhaul is routed from the each connected Ethernet port to the parallel remote unit.
- idRUs – remote units

NOTE: Each MSDH supports up to 16 standard SFPs (<10 km), where eight of the SFPs can be long range (>10 km).

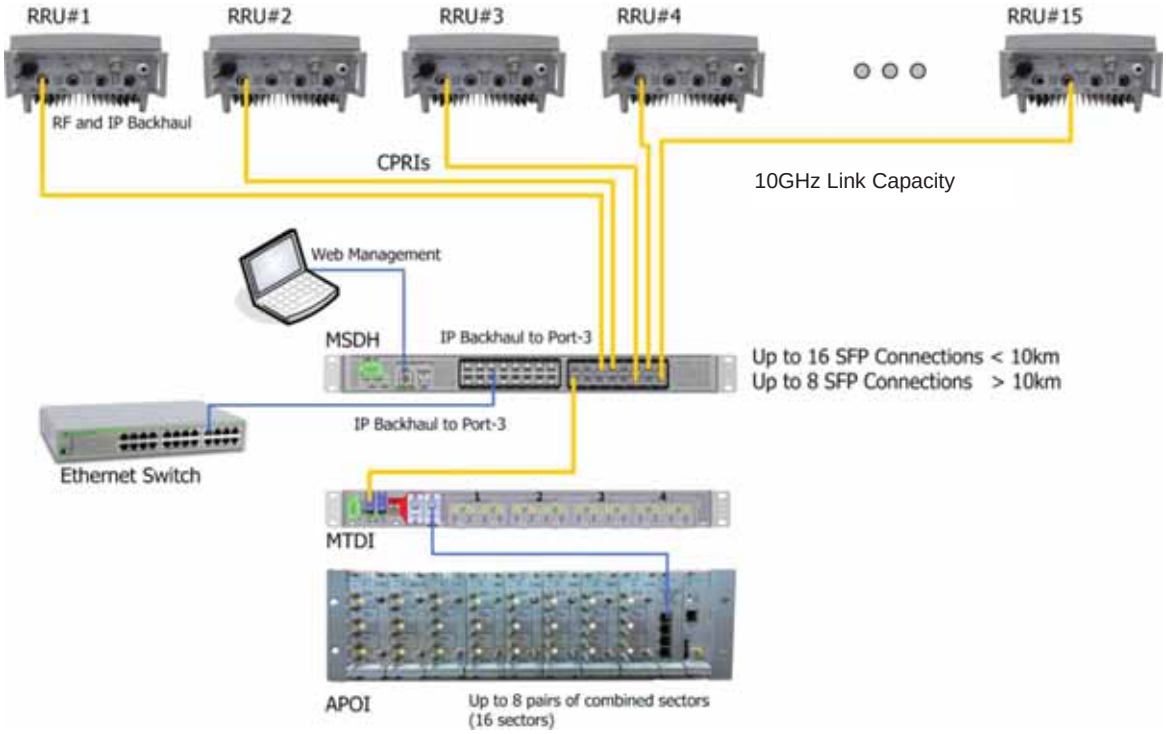

Figure 2-1. Example of a Basic Topology

2.2 Cascaded idRU Topology

This topology supports up 36 idRUs connected to the MSDH in cascades or 'strings' of up to six remotes per string. The first remote in the string is connected directly to the MSDH, and the remaining remotes in the same string are interconnected. All connections are CPRI based.

This provides more coverage per fibre optic link between the MSDH at the headend and remotes. The following figure illustrates the connections for a single cascade.

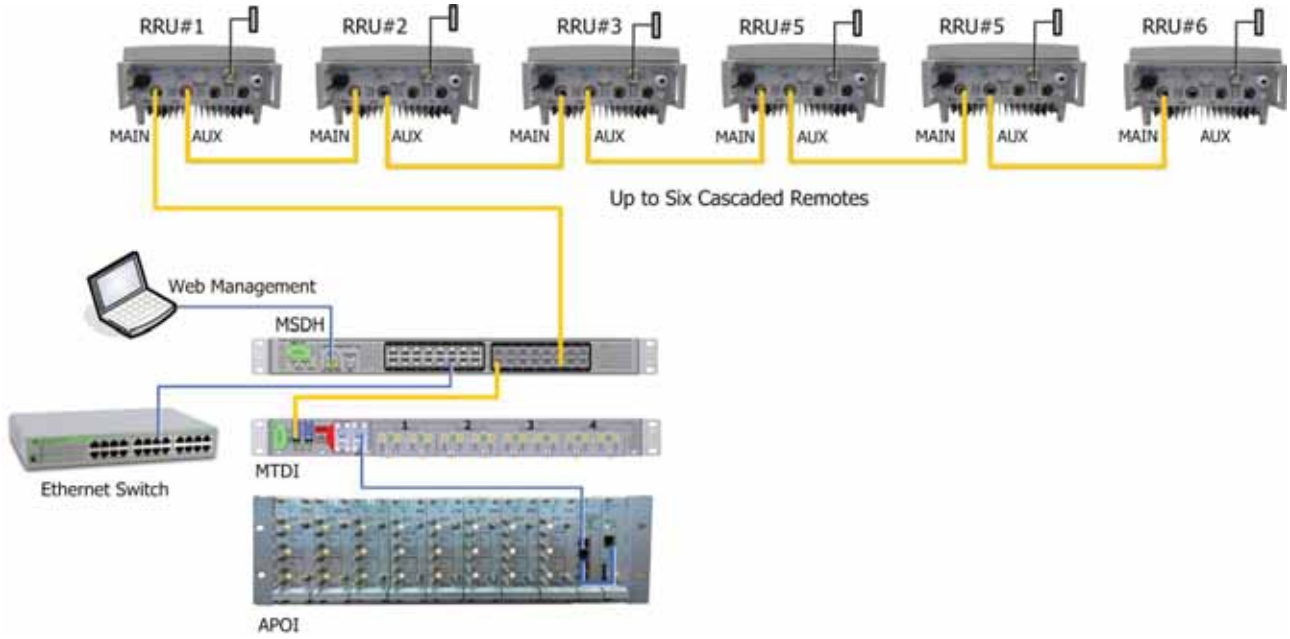

Figure 2-2. Example of a Cascaded idRU Topology

The following example illustrates an installation with several strings for a maximum of up to 36 idRUs per installation.

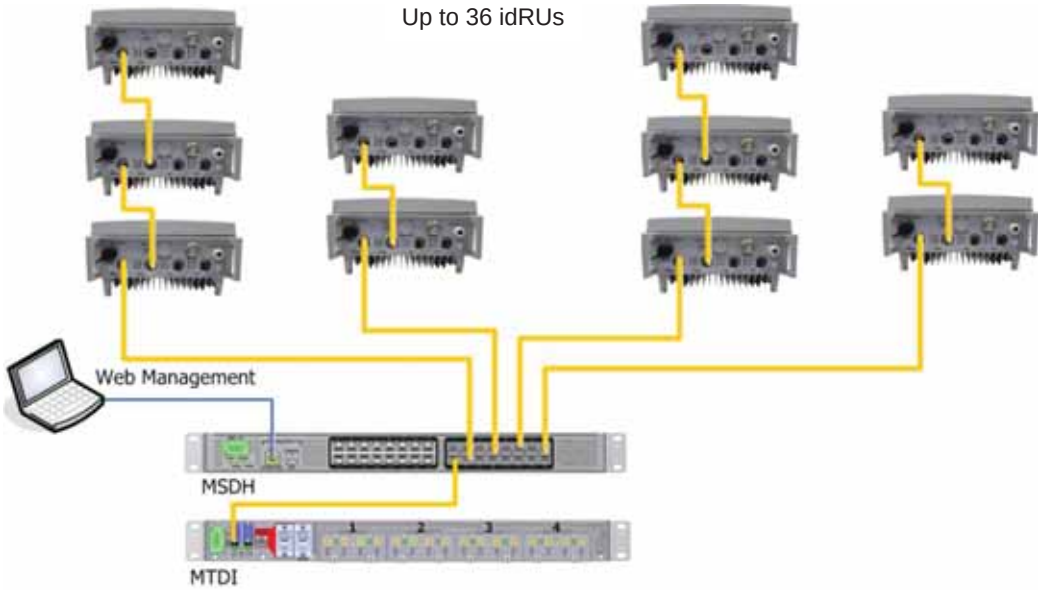

Figure 2-3. Example of a Cascaded idRU Topology with Several Strings

2.3 Master Slave Topologies

This topology provides single source management for two cascaded MSDH units. A total of 36 idRUs are supported for the installation that includes both MSDH units.

In this type of installation, the two MSDH units are cascaded and each MSDH unit interfaces to dedicated idRUs or idRU cascades referred to as 'strings'. Depending on the required capacity, the MSDH units can be fed from either a single MTDI connected to the Master MSDH, or each MSDH may be fed from a dedicated MTDI.

To implement single source management, the MSDH units are interconnected via one of the CPRI ports. One of the units is configured as Master, and the other as Slave. All management is performed via the Master MSDH. See section 4.4.5.1 for connections.

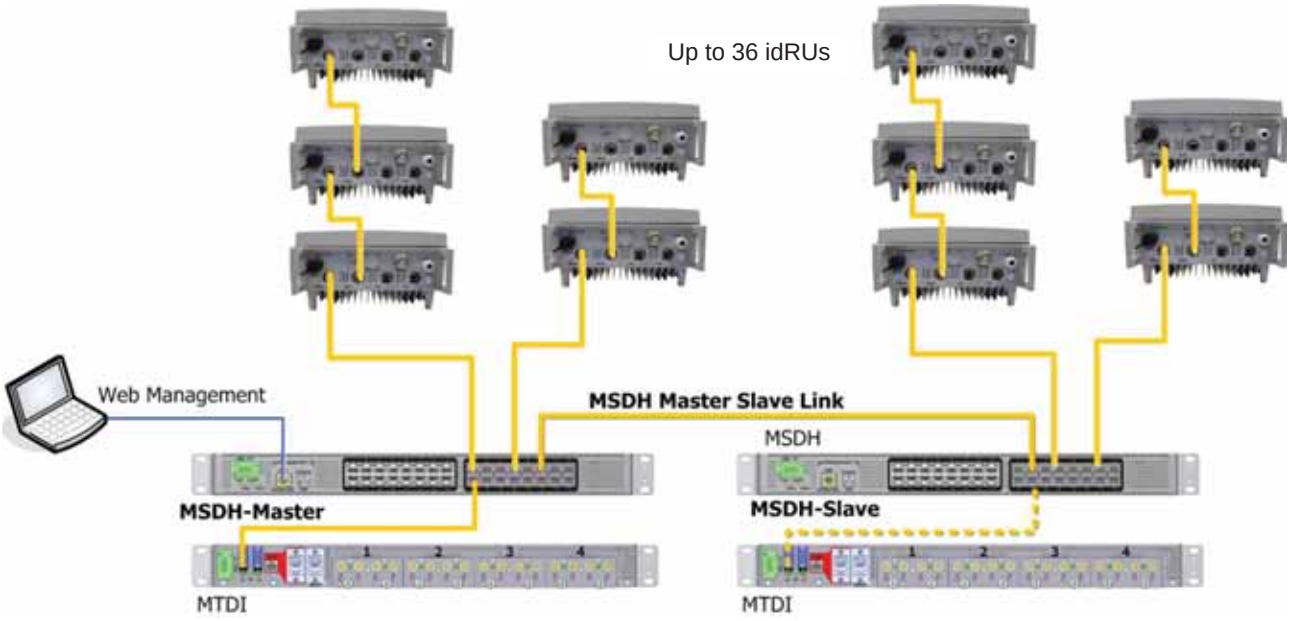

Figure 2-4. MSDH Master Slave Configuration

2.4 Redundancy Driven Topologies

The majority of public safety distributed coverage solutions require a high level of redundancy to ensure no single point of failure results in a total loss of service which could have a detrimental impact to general public safety and security.

Currently, idDAS supports two types of redundancy driven topologies:

- RF source redundancy, in which redundancy is provided for the RF source chain feeding the remote units. These include the BTS farms, MTDI elements, and MSDH elements.
- Dual-system redundancy, in which redundancy is provided for the RF source as well as the remote units.

2.4.1 RF Source Redundancy Driven Topologies

The RF source redundancy driven topology supports end-to-end *cell resource redundancy* for a system with up to 36 cascaded remotes, installed in strings of up to six remotes per string. Each remote in a cascade has access to two independent RF feeds that include BTS farms, MTDI, and MSDH units. *Redundancy is provided per individual cell resource in each remote.* One of the RF feeds is designated and configured as Primary and the other as Secondary, and each remote is allocated either the Primary or Secondary RF source as the default RF feed.

If an issue such as an unavailable RF source or CPRI is detected, failover occurs *only for the affected cell resources* and the appropriate alarms are generated. Failover occurs only after the availability of the alternate resource is verified. Once the issue causing failover has been resolved, fallback automatically occurs.

Referring to Figure 2-5 and Figure 2-6, the physical connections are implemented as follows:

- The idRUs are cascaded by interconnecting their Main and Auxiliary ports.
- The cascade is fed by two parallel and independent RF source chains – one at each end. Each RF chain consists of a BTS farm, MTDI, and MSDH systems.
- The idRU at each end is connected to the *same* port number on the corresponding MSDH.
- For synchronization, the Primary MSDH and Secondary MSDH units are interconnected via a link between the *same CPRI* port numbers on each MSDH. Additional synchronization links can be connected for redundancy.
- The MSDH units can be located at a distance of up to 40Km from each other.

NOTE: The MSDH and MTDI connections for this specific topology are detailed in Section 4.4.5.2. The idRU connections for this topology are described in Section 5.6.3.3.

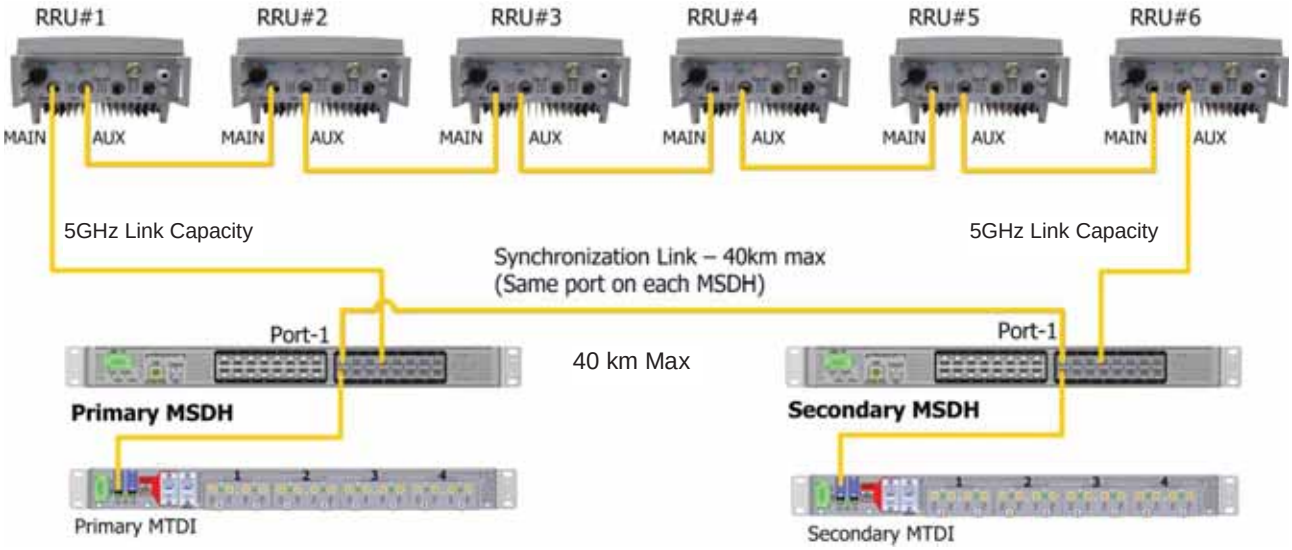

Figure 2-5. Physical Connections of the Redundant idDAS Systems

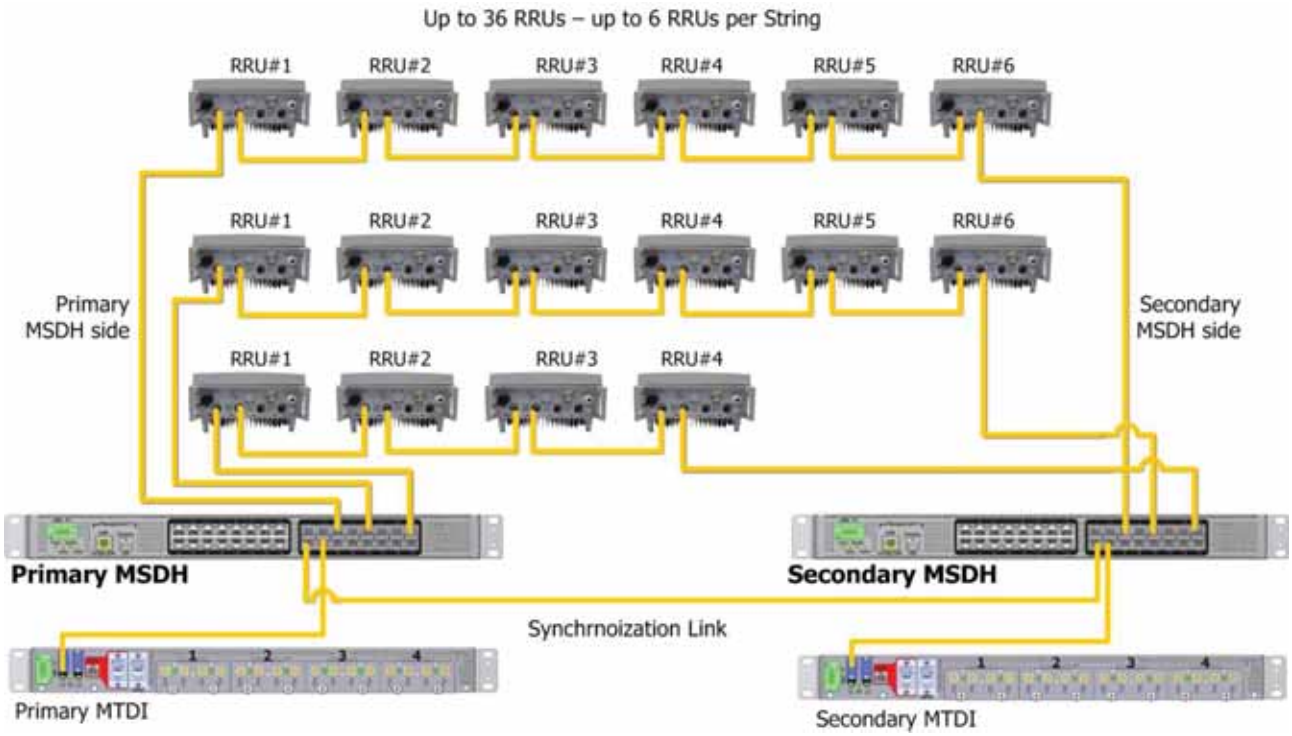

Figure 2-6. Illustration of an RF Source Redundancy Driven Topology

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2.4.2 Dual-System Redundancy

The dual-system redundancy driven topology provides full, end-to-end redundancy consists of two independent systems, where only one of the systems transmits RF at any one time. By default, the user designated 'Active' system transmits RF, and the designated Standby system is muted. If a fault is detected, switchover occurs.

Each system consists of an independent set of BTS, MTDI, MSDH, and idRU units. Both systems are connected to the same IP network via a switch and are configured to communicate with each other, in order to continually analyze conditions and perform the required redundancy related procedures.

If an issue such as an unavailable RF source or CPRI is detected, failover occurs *to the other system* and the appropriate alarms are generated. Failover occurs only after the availability of the alternate resource is verified. Once the issue causing failover has been resolved, fallback occurs automatically by default. Fallback can also be user configured to occur manually upon user command.

NOTE: Each system is installed as a standard system and both systems are connected to the network. The dual-system topology is implemented by configuring the required parameters via the Web management application. The procedure is described in the **idDAS Commissioning Guide**.

The following figure illustrates a basic dual-system redundancy installation that includes one MSDH and one MTDI per system.

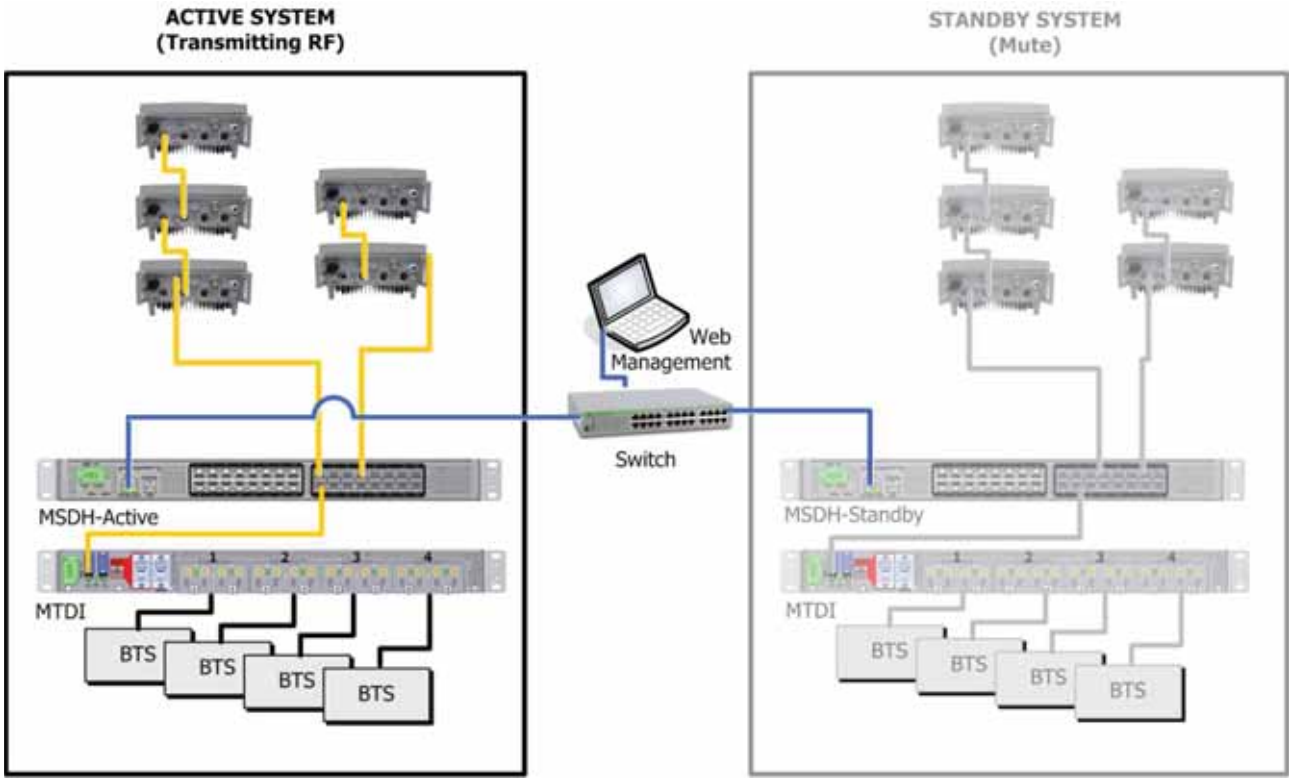


Figure 2-7. Example of A Basic idDAS Dual-system Redundancy Topology

The following figure illustrates a dual system redundancy installation with Master-Slave MSDH and multiple MTDIs per system. The MTDIs can be connected to the same MSDH or to dedicated MSDH units.

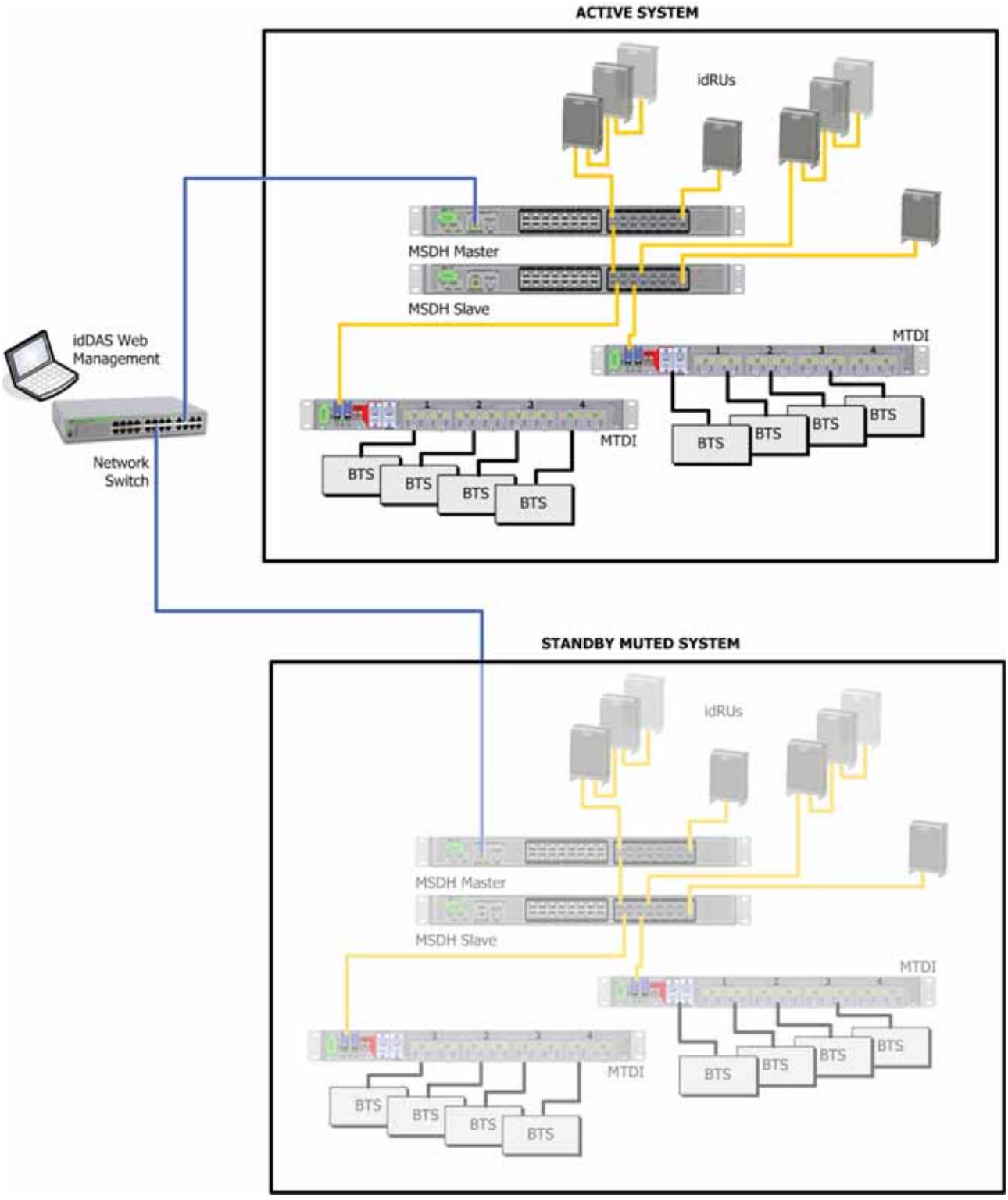


Figure 2-8. Example of Dual-system Redundancy Topology with Master-Slave and Multiple MTDIs

2.5 Additional Applications

This section describes special topologies for specific types of requirements. The general architecture and the system elements operate as described in section 1.2 however the connections are specific to each type of special topology.

The following topologies are covered in this section:

- Single CPRI link remote routing of additional services
- idDAS for Australia configuration
- WCS band configuration
- Five band SISO configuration
- Multi-operator eight band MIMO configuration

NOTE: This section provides a general description of each configuration. Details on connections for each type of configuration are provided in the relevant installation sections.

2.5.1 idDAS for Australia

This configuration requires the following main elements:

- idRU 40 tri-band 700/2300TDD/2600
- idRU 40 quad-band 850/900/1800/2100 40/43 dB
- 7-band Plexer-Combiner
- Antenna Hybrid

The relevant frequencies are fed to each remote unit via a dedicated CPRI link to the MSDH. At each remote, the signals are filtered and amplified.

The idRU tri-band frequencies (700/2300TDD/2600) are multiplexed to a single output which is fed to the Antenna Hybrid unit. The idRU quad-band frequencies are fed to the External Plexer/Combiner as shown in Figure 2-9. At that point they are combined and fed to the Antenna Hybrid unit.

All the signals are combined for routing over a single antenna (or optionally a dual antenna), infrastructure. Figure 2-9 provides a general view of the architecture; Figure 2-11 shows more details.

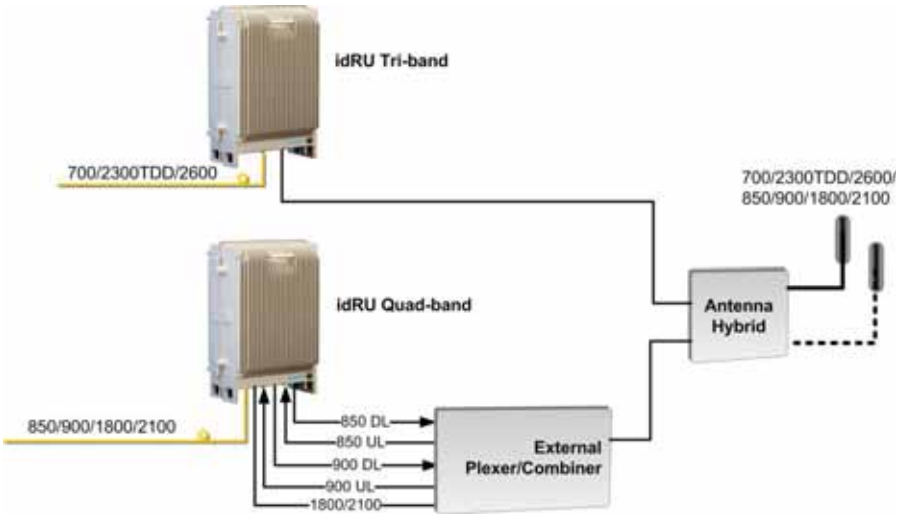


Figure 2-9. Example of Australia Seven-band Topology

Figure 2-10, provides a detailed block diagram of the same topology for Australia. Note the following:

- The CPRI link must support the needed capacity.
- The topology is implemented for the usage of three operators, where some bands are allocated to one operator, some to two operators and some to three operators.
- Headend elements:
  - The APOI, MTDI and MSDH installations are standard as described in Chapter 3.
  - Two APOI and two MTDI units are required for this topology. Available APOI and MTDI chassis slots can be used for additional capacity.
  - The APOI chassis can support up to eight band modules and the MTDI chassis up to four band modules. The block diagram below shows only the relevant modules.

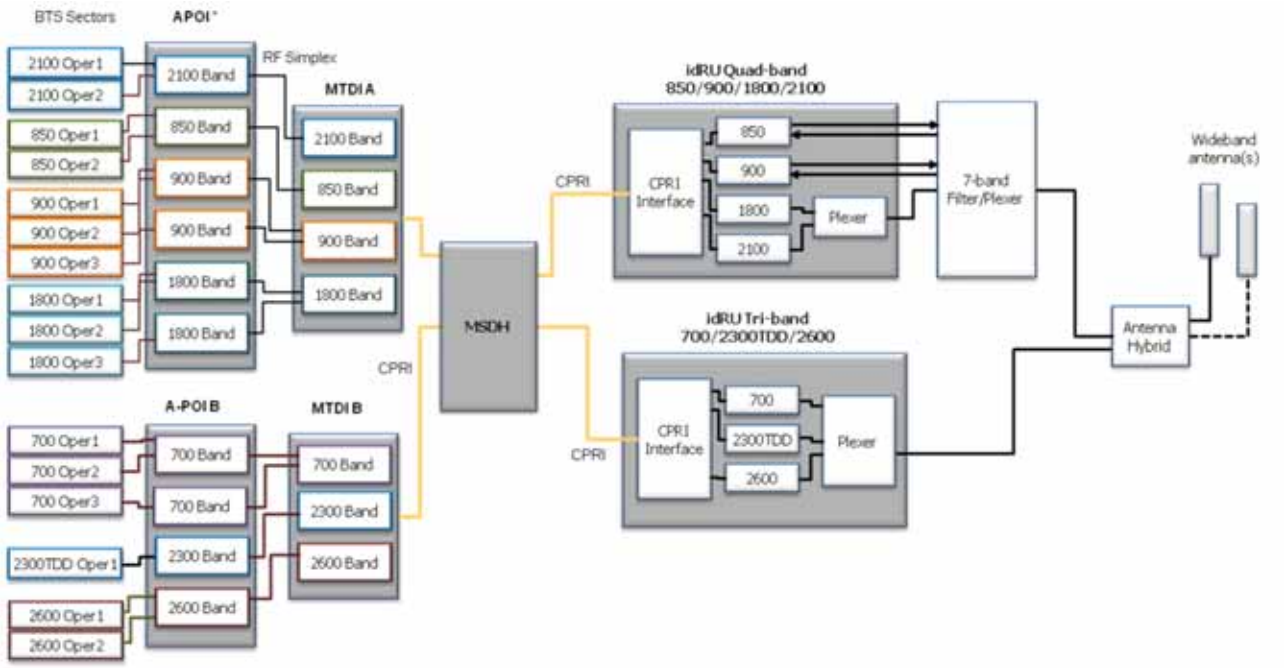


Figure 2-10. Details of Australia Seven-band Topology Example

2.5.2 WCS Applications

To implement a MIMO configuration of WCS and 700/850/1700/1800 bands, three idRUs are required:

- Two quad-band idRUs supporting 700, 800, 1700 and 1800 MIMO A and MIMO B bands;
- One idRU supporting *two* 2300 LTE TDD filters, amplifiers and antennas ;

Each quad-band idRU receives its bands along with the 2300FDD band from the MSDH via a dedicated CPRI link. The filtered and amplified services from each idRU are forwarded to the idRU 2300 TDD, along with the 2300 TDD.

At the 2300 idRU, the 2300 band is filtered, amplified and combined with the other (previously filtered bands) for distribution over two antennas at the idRU 2300 TDD.

Note the following

- The CPRI link must support the needed capacity.
- Headend elements: the APOI, MTDI and MSDH installations are standard as described in Chapter 3.
- The idRU installation procedure described in Chapter 5 includes specific instructions for the WCS configuration, in all relevant sections.

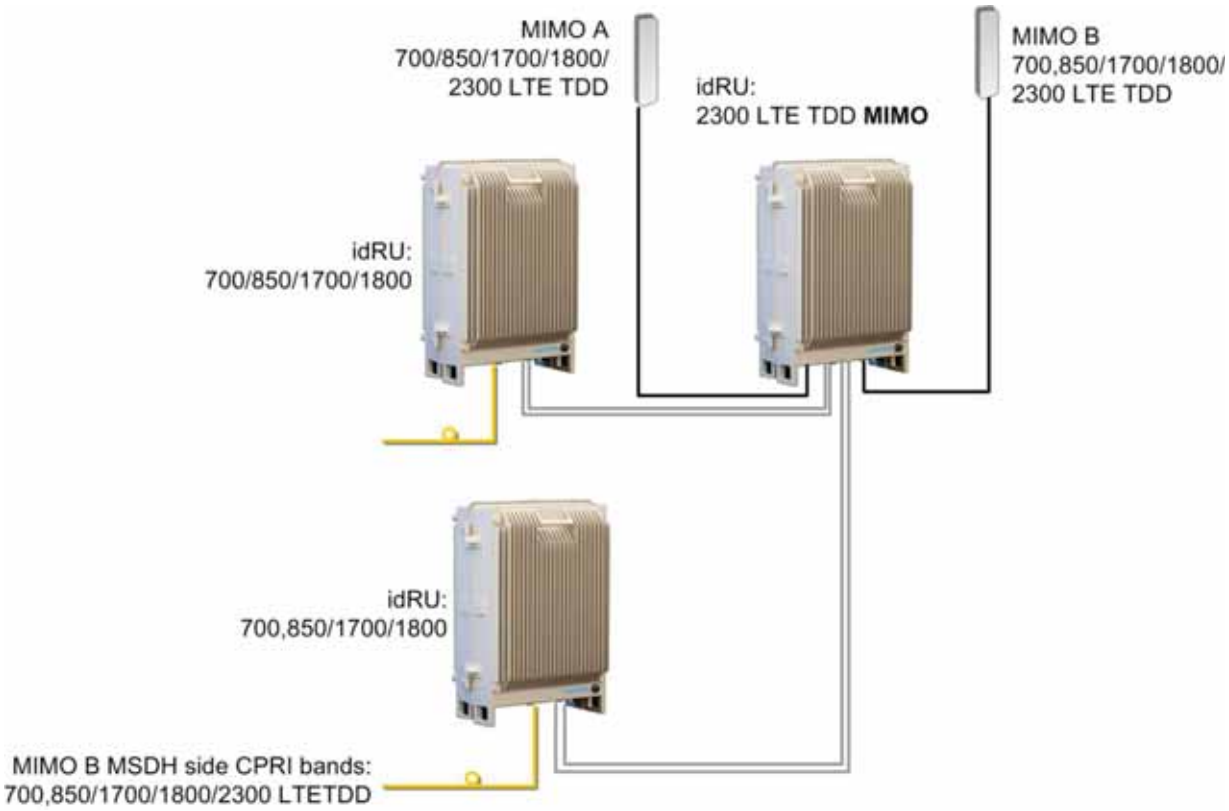


Figure 2-11. Illustration of a WCS Configuration

2.5.3 Five Band SISO Configuration

The five-band SISO configuration distributes five bands (800, 900, 1800, 2100 and 2600) over a single antenna infrastructure connected to one of the repeaters (Main).

All five bands are transferred over a *single* CPRI connection from the MSDH. The Main idRU conditions four of the bands and the Aux idRU conditions one of the bands (2100). All five bands are then distributed over the same antenna infrastructure connected to the Main idRU.

NOTE: The CPRI link must support the needed capacity.

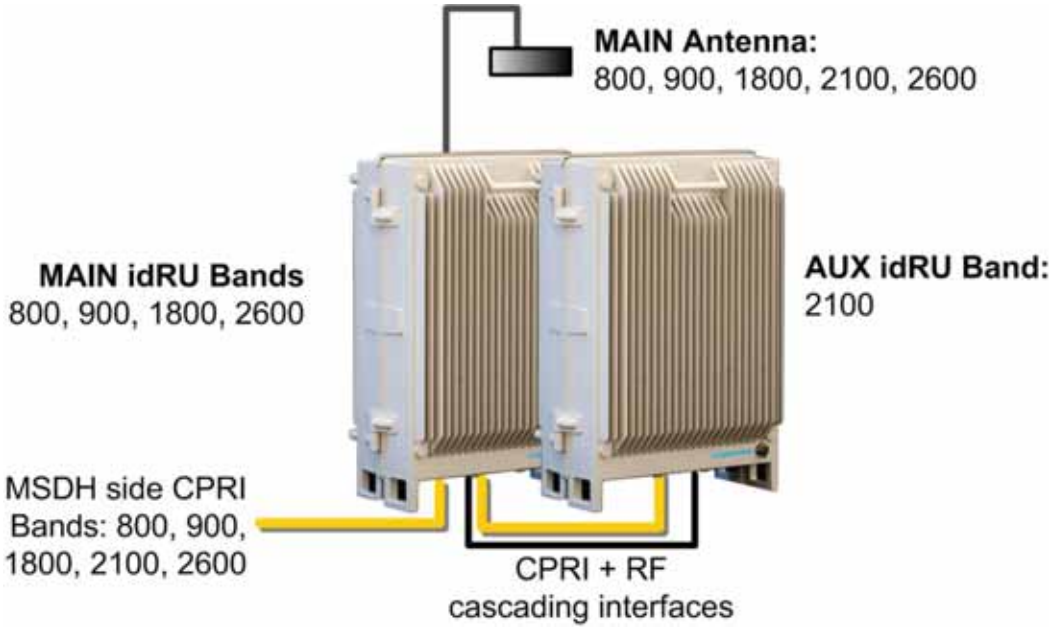


Figure 2-12. Example of Five Band SISO Topology

2.5.4 Multi-Operator Eight Band MIMO Configuration

The eight-band MIMO configuration routes eight bands (800MIMO, 900, 1800MIMO, 2100 and 2600MIMO) over a *single* CPRI link, for conditioning and distribution at the remote end over two remote units with dedicated antennas.

All eight bands are transferred over a *single* CPRI connection from the MSDH. The Main idRU conditions and distributes four of the bands; the Aux idRU conditions and distributes four other bands.

NOTE: The CPRI link must support the needed capacity.

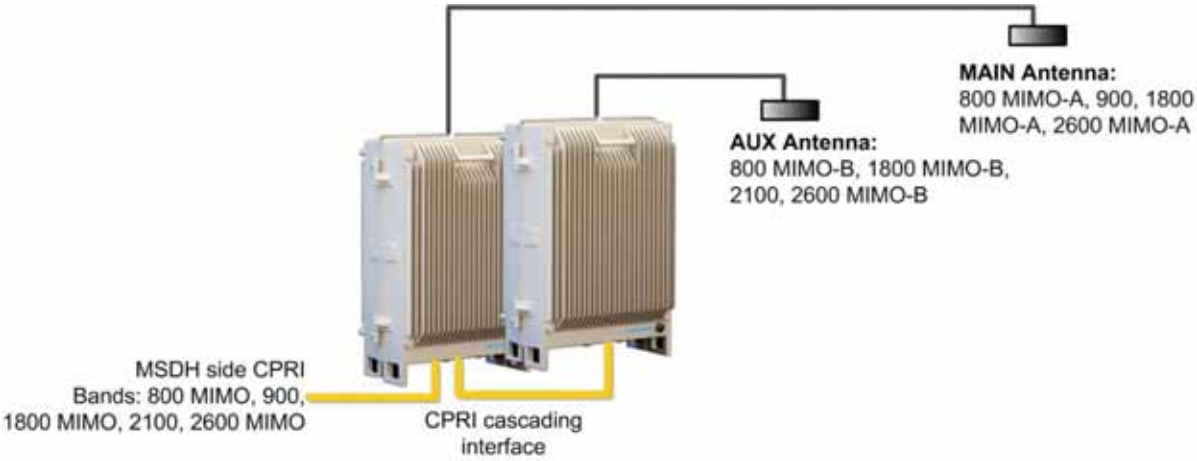


Figure 2-13. Example of Eight Band MIMO Topology

3 System Installation Requirements

This chapter provides the following information

- General warnings
- Public safety pre-installation requirements
- Location selection criteria
- Optics related requirements
- Grounding wire requirements
- Power requirements and power cables
- EMV protection
- idRU service antenna requirements

3.1 General Warnings

⚠ ATTENTION!

- The installer is held accountable for implementing the rules required for deployment.
- Good engineering practice must be used to avoid interference.
- Output power should be reduced to solve any IMD interference issues

⚠ ATTENTION!

- *L'installateur est tenu responsable de la mise en œuvre des règles nécessaires pour le déploiement.*
- *Les bonnes pratiques d'ingénierie doit être utilisé pour éviter les interférences.*
- *La puissance de sortie doit être réduite pour résoudre tous les problèmes d'interférence de l'IMD.*

3.2 Public Safety Installation Requirements

⚠ ATTENTION!

- Public safety idDAS installations do not utilize APOI.
- Input RF power to the MTDI = 0dBm.
- The RF power source (e.g. BTS) is connected to the MTDI via the appropriate attenuators to provide an input RF power level of 0dBm.

3.2.1 idRU PS Required Tubing for NEMA 4 Compliance

For public safety idRUs with NEMA 4 ready enclosure

In order to meet NEMA 4 sealing requirements, it is required to use tubing meeting the following specifications for all CPRI and ETH idRU connections:

- Manufacturer – **REIKU**
- Product – Tubing for Cable Protection
- PA REG / PA REB Polyamid 6, light, simple
- Article No. – Black PA REB-23F (or Gray PA REG-23F)
- NW 23mm

- 32/21 M/PG
- d2 28.3, d1 22.8
- 45mm Radius (Stat.)
- 9.0Kg/100m
- 50m VE,PU

3.3 Headend and idRU Location Criteria

This section describes the locations criteria for the headend elements and for the remote units.

3.3.1 Headend Elements Location Criteria

The following criteria should be considered when selecting the installation site location for the head-end elements:

- Distance from BTS (for relevant elements) - it is recommended that the installation location be as close as possible to the BTS site in order to maintain the cable loss to a minimum.
- General surroundings and accessibility of location must be considered.
- Install the elements in a shielded, ventilated, and easy-to-reach area – preferably at eye level.
- There must be adequate airflow and ventilation within the rack and around the installed components so that the safety of the equipment is not compromised.
- Electro-Static Discharge (ESD) precautions must be followed.
- Ambient environment temperature must not exceed 50°C (122°F).

3.3.2 idRU Location Criteria

Location criteria

- **Wall compatibility -** check the suitability of the wall on which the unit is to be to be fitted.
- **Plan mount -** check the actual fixing centers (see below) and overall dimensions of the unit enclosure. The unit is supplied with two wall mounting brackets; when the unit is mounted on these brackets adequate ventilation is provided between the unit and the wall to which it is fixed.
- **Plan connection cable clearances -** the Optical, RF and power connections located on the underside of the unit will need at least 300mm vertical clearance below the unit to enable the connections to be made. The minimum bend radius for Optical and RF cables must not be less than the recommendations made by the cable manufacturer. Plan the cable runs and ensure adequate space is available.
- **Allow for door opening** - ensure that there is sufficient space at the front of the unit to allow the door to be fully opened and for maintenance engineers to get access to the unit with test equipment such as a spectrum analyzer. Allow an additional 500mm of space in front of the unit when the door is fully open.
- **Allow for heat dispersion -** Mount the repeater so that heat can be dispersed from it.

  The repeater wall mounting kit ensures an optimum airflow between the wall and the repeater.) Do not block this air channel as it will cause the MTBF of the repeater to drop dramatically, or even in the worst case cause the repeater to fail completely.

  If possible, use a wall in the shade to minimize the overall sun loading. If sufficient shielding cannot be obtained, an additional sun shield should be mounted.

3.4 RF Cable Installation Guidelines

⚠ **DC Blocks Required**	In some installations, under certain site conditions, it is required to add DC Blocks to the antenna cables of the remote units. For example, in installation locations with power cables that can induce currents resulting in trackside voltages or loop currents. In these types of situations, DC Blocks are required to protect the idDAS remotes from damage.
⚠ ***Blocs DC Requis***	*Dans certaines installations, dans certaines conditions de site, il est nécessaire d'ajouter des blocs DC aux câbles d'antenne des répéteurs. Par exemple, dans les emplacements d'installation avec des câbles d'alimentation qui peuvent induire des courants entraînant des tensions de voie ou des courants de boucle. Dans ce type de situations, les blocs DC sont nécessaires pour protéger les répéteurs idDAS contre les dommages.*

Note: idRU-30 mobile antenna interface is 7/16 DIN RF connector; idRU-40 mobile antenna interface is 4.3-10 RF connector.

- All coaxial connections to/from the Repeater must be high performance, flexible, low loss 50 ohm coaxial communications cable.
- All cables shall be weather-resistant type.
- Cable length - determined by the Repeater installation plan. When calculating the cable length, take into account excess cable slack so as not to limit the insertion paths.
- Make sure the cable and the connector are compatible. Using cables and connectors from the same manufacturer is helpful.
- All connectors must be clean and dry.
- Waterproof all outdoor connections using silicon, vulcanizable tape or any other suitable substance, as moisture and dust can impair RF characteristics
- Make sure enough room has been allocated for the bending radius of the cable. RF cables must not be kinked, cut or damaged in any way.
- Connect the RF cable to the antenna tightly but without damaging threads.
- Fasten cable tightly to cable ladder or aluminum sheet.
- For short length feeder cables, use 1/2”; for longer feeder cables, use 7/8”. Choose thicker coax cables for lower attenuation. Minimize the length of the coax cables to reduce attenuation.
- Use jumper cable for easy installation. The RF coaxial cable can be substituted at each end with a jumper cable.

3.5 Optics Related Requirements

This section provides the following information:

- Optic fiber cable requirements
- Examples of supported CPRI transport cables
- Information on required SFPs for the MSDH and for remotes

3.5.1 Optic Fibre Cable Requirements and Warnings

CAUTION! Un-terminated optical receptacles may emit laser radiation. Do not stare into beam or view with optical instruments.

PRUDENCE! *Récipients optiques qui ne sont pas terminées peuvent émettre un rayonnement laser. Ne pas regarder le faisceau ou voir avec des instruments optiques.*

NOTE: In case of bi-directional SFP modules, be sure to use matching SFP module pair.

- This product is equipped with class 1 lasers, as per definition in EN 60825-1.
- All the SFP+ modules have LC/UPC fibre connectors.
- Cable length - determined by the installation plan. When calculating the cable length, take into account excess cable slack so as not to limit the insertion paths.

3.5.2 Examples of Supported CPRI Transport Cables

As opposed to legacy fibre-optic systems that can only use single mode fibre cables, idDAS architecture being cable agnostic, allows, existing infrastructure within buildings to be utilized. These infrastructures include single-mode and multimode copper cables as listed in the table below.

CABLE TYPE	STANDARD	MAXIMUM LINK DISTANCE
Fibre	Multimode-OM4	Up to 300m
Fibre	Multimode-OM3	Up to 200m
Fibre	Single Mode	Up to 10/20/40/80 km

3.5.3 SFPs for idRU and MSDH Elements

- Be sure to order the required SFPs for your MSDH and idRUs.
- For a list of available SFPs, refer to Chapter 8.
- Note that the SFPs for MSDH and for the corresponding idRUs match.

3.6 Grounding Wire Requirements

- Where relevant, ground the units with their grounding bolts.
- Protective grounding conductor - should be aluminum with cross-section 10AWG.
- Lug of the protective grounding conductor - should be aluminum
- Washers and screw - should be high Cr stainless steel, or 12% Cr stainless steel, or Cr on, Ni on steel, tin on steel

3.7 Power Requirements and Power Cables

3.7.1 Power Feeding Equipment Requirements

⚠ ATTENTION!

- All power equipment for feeding of idDAS rack units (APOI, MTDI and MSDH) is required to meet NEC CLASS 2 standards.
- DC units must be powered from safety approved DC power distribution unit according to IEC/EN/UL 60950-1 or IEC/EN/UL 62368-1and which limited to 60V DC maximum.

⚠ ATTENTION!

- *Tous les équipements de puissance pour l'alimentation des idDAS unités de rack (APOI, MTDI et MSDH) est nécessaire pour répondre à NEC CLASS 2 normes.*
- *Les unités CC doivent être alimentées par une unité de distribution d'alimentation CC conforme à la norme IEC / EN / UL 60950-1 ou IEC / EN / UL 62368-1 et limitée à 60V DC maximum.*

3.7.2 Power Specifications for System Elements

This section describes the power feeding and power consumption for all idDAS elements: cellular headend and remote, public safety remotes, and bespoke applications.

3.7.2.1 Headend Elements Power Specifications

APOI	POWER FEED	AMP / FEED	POWER CONSUMPTION*
APOI	100-240V~ 50/60Hz	1A Max	36W Max*
	48 V DC	2A Max	36W Max*
MTDI	**POWER FEED**	**AMP / FEED**	**POWER CONSUMPTION***
MTDI	100-240V~ 50/60Hz	2A Max	140W Max*
	48 V DC	3A Max	140W Max*
MSDH	**POWER FEED**	**AMP / FEED**	**POWER CONSUMPTION**
MSDH	100-240V~ 50/60Hz	2A Max	150W Max
	48 V DC	3A Max	150W Max

(*) APOI Rack with 8 band modules, fanless configuration; MTDI rack with 4-band modules.

3.7.2.2 Cellular idRU Power Specifications

IDRU 30	POWER FEED	AMP / FEED	POWER CONSUMPTION
Quad-Band idRU 30	100-240V~ 50/60Hz 48V DC	3A Max 3A Max (per feed)	210W Max
IDRU 40	**POWER FEED**	**AMP / FEED**	**POWER CONSUMPTION**
Quad-band idRU 40	100-240V~ 50/60Hz	12A Max	690W to 820W

3.7.2.3 Public Safety idRU Power Specifications

IDRU 40	POWER FEED	AMP / FEED	POWER CONSUMPTION
Single-band Tetra idRU 40	48V DC	5A Max	193W

3.7.2.4 Bespoke Headend Elements Power Specifications

APOI	POWER FEED	AMP / FEED	POWER CONSUMPTION
APOI	12 V DC	3A Max	36W Max*
MTDI	**POWER FEED**	**AMP / FEED**	**POWER CONSUMPTION**
MTDI	12 V DC	10A Max	120W Max*
MSDH	**POWER FEED**	**AMP / FEED**	**POWER CONSUMPTION**
MSDH	12 V DC	12A Max	150W Max

(*) APOI Rack with 8 band modules, fanless configuration; MTDI rack with 4 band modules.

3.7.3 Circuit Breaker Requirements

- Calculate the required fuse protection, referring to section 3.7.2. The calculated value of the circuit breaker should be 125% of the sum of the maximum current rating of the unit(s).
- Verify a circuit breaker is located at an easily accessible distance and location from the units.
- Circuit breaker needs to be Type-C SAFETY approved.
- For idRU0036 operating up to 220VAC nominal, circuit breaker needs to be Type-C, 10A safety approved.
- Care must be taken in positioning all electrical equipment in relation to the position of the water supply pipes/air-conditioning water pipes in case a leak or burst pipe should occur.

⚠ ATTENTION! Maximum power consumption on each power line (over a pair of wires) for rack units (APOI, MTDI and MSDH) input power is 100VA or less.

⚠ ATTENTION! *Consommation d'énergie maximale sur chaque ligne d'alimentation (sur une paire de fils) pour les unités de rack (APOI, MTDI et MSDH) puissance d'entrée est 100VA ou moins.*

Below is an example of a circuit breaker plan for a DC powered idDAS headend elements rack.

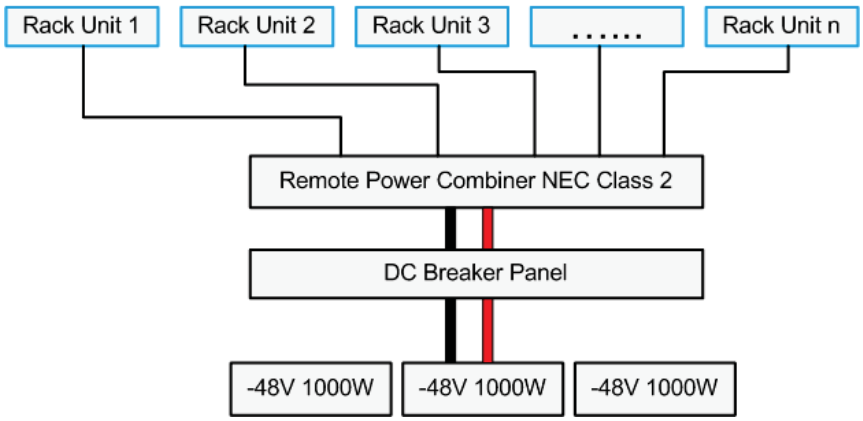


Figure 3-1. Example of Circuit Breaker Plan for DC Powered Headend Elements

3.7.4 AC Power Cables

This section describes the headend and remote end AC power cables.

3.7.4.1 Headend Elements - AC Power Cables

AC Power Cables are provided only for AC powered units, where the supplied power cord meets the requirements of your geographical location. One or more of the following AC power cords is supplied:

COUNTRY	AC CORD DESCRIPTION
UK and Singapore	AC power cord UK and Singapore, **straight (C13),** 13A 250V AC, 2.5 m
Australia and New Zealand	AC power cord Australia and New Zealand, **straight (C13)**, 10A 250V AC, 2.5 m
USA	AC power cord USA, **straight (C13)**, 10A 125V AC, 2.5 m

3.7.4.2 idRU AC Power Cable Description

The supplied power cord meets the requirements of your geographical location.

AC Power Cable	One or more of the following cords is supplied for AC powered units: AC power cord Europe, **Binder IP67**, 16A 250 V AC, 2.5m AC power cord UK and Singapore, **Binder IP67**, 13A 250V AC, 2.5m
AC Cable specifications	SVT 18/3C power cord; Flexible power cord, 18AWG, 300V, 10A, 75°C.

3.7.5 idRU AC Outdoor Installation

⚠ CAUTION! Follow these guidelines for **AC Powered** idRU units installed outdoors.

⚠ PRUDENCE! *Suivez ces instructions pour AC Propulsé unités idRU qui sont installés à l'extérieur.*

For AC powered idRUs installed outdoors

- Add external to the unit, a surge suppressor rated min. 2500V:
  - **For Europe** – the surge arrestor should be installed according to local installation code and comply with IEC 61643-series.
  - **For USA and Canada** - the surge arrestor should be installed according to CEC Section 280 and NEC 26-500 to 26-512 and ANSI/NFPA70 and comply with UL 1449 standard.
- **Rise of earth potential**

  Attention is drawn to the fact that during fault clearing conditions, HAZARDOUS VOLTAGES may exist and by accessible for longer periods than indoor equipment and special earthing conditions may be necessary. These are typically specified in local installation codes.

NOTE: in the USA, these requirements are contained in the National Electric code. In Canada, these are contained in the Canadian Electrical Code.

3.7.6 DC Power Feed Cable Requirements

3.7.6.1 Headend Elements DC Cable Requirements

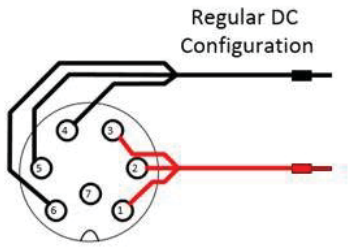
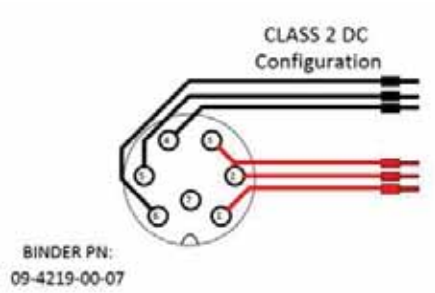
The APOI, MTDI, and MSDH DC cable specifications are as follows:

- 4 wire; #18; multi-conductor unshielded;
- Gray polyvinylchloride jacket overall, 3m max.

3.7.6.2 idRU DC Cable Specifications

The idRU DC cable specifications are as follows:

- 6 wire; #18; multi-conductor unshielded;
- Gray polyvinylchloride jacket overall, 3m max.

REGULAR DC CONNECTOR	CLASS 2 DC CONNECTOR
 For -48V DC Feeding: • Connect Positive to RTN (0V) • Connect Negative to -48V DC *Figure 3-2. Regular DC Connector Pinout*	 For -48V DC Feeding: • Connect Positive to RTN (0V) • Connect Negative to -48V DC *Figure 3-3. Class 2 DC Connector Pinout*

3.8 EMV Protection

> ⚠ CAUTION!
> Protect all coaxial cables and power cables from the transients caused by lightning.
> If insufficient Electromagnetic Protection is provided, or if EMV measures are not taken, warranties issued by Cobham Wireless are not valid.

> ⚠ PRUDENCE!
> *Protégez tous les câbles coaxiaux et les câbles d'alimentation des transitoires causés par la foudre.*
> *Si insuffisante protection électromagnétique est fourni , ou si des mesures ne sont pas prises EMV , les garanties émises par Cobham sans fil ne sont pas valides.*

Connect the lightning protection

The lightning hazard to electric and electronic equipment consists in the interferences of direct lightning current infections and high surge voltages induced by the electromagnetic field of nearby lightning channels or down conductors. Amplitudes from cloud-to-earth lightning amounts to several 10kA and may last longer than 2 ms. The damage caused depends on the energy involved and on the sensitivity of the electronics systems.

For detailed information please refer to IEC 61024-1 and 61312-1 for international standards for protection of information systems against LEMP (Lightning Electromagnetic Pulse), including radio transmitters. They define proper planning, installation and inspection of effective lightning protection systems.

Ensure that lightning protection measures are taken to create a reliable repeater site. *Protect all coaxial cables and power cables from the transients caused by lightning.* Fit all cables with suitable lightning protection devices.

The Cobham Wireless repeaters comply with the EN standard ETS 301 498-8 which stipulates demands on lightning/surge protection for typical infrastructure telecom equipment installations.

Several lightning protection devices should be used in series with declining threshold voltages to help attenuate the pulse component which makes it through the first layer of protection.

The primary protective device is part of the site installation and is not supplied by Cobham Wireless. Coaxial lightning protection is normally one of these three types: gas capsule, high-pass and bandpass. *A protective device is also required on the power supply cord.*

Figure 3-4: Protective device installed in connection with the power supply

3.9 idRU Service Antenna Requirements

This section describes the requirements for installing the service antennas.

idRU Compliance to FCC and IC

⚠ WARNING!

- Direct connection of antenna to the SERV/MOB port is not permitted.
- To ensure that the noise and spurious emissions levels meet the limits defined in RSS-131, the following conditions must be met on installation, for the following specific models:

id-DAS-RRU-3707-3708-PS-NFPA-DC
id-DAS-RRU-3707-3708-PS-NFPA-AC
id-DAS-RRU-3604-PS-NFPA-AC

-6dBd Antenna Gain Assembly

Antenna Assembly Gain[dBd] = Gain Antenna[dBi] – 2.15 – Loss of cables/splitters[dB] ≤ -6dB

Conformité du répéteur idRU aux normes FCC et d'Industrie Canada

⚠ *AVERTISSEMENT!*

- *La connexion directe de l'antenne au port SERV/MOB n'est pas autorisée.*
- Pour *s'assurer que les niveaux de bruit et d'émissions parasites restent dans les limites définies par le CNR-131, les conditions suivantes doivent être remplies lors de l'installation pour les modèles spécifiques suivants:*

id-DAS-RRU-3707-3708-PS-NFPA-DC
id-DAS-RRU-3707-3708-PS-NFPA-AC
id-DAS-RRU-3604-PS-NFPA-AC

Gain de l'ensemble antenne -6dBd

Gain de l'ensemble antenne [dBd] = Gain de l'antenne[dBi] – 2.15 – Perte des câbles/diviseurs [dB] ≤ -6dB

3.9.1 General Considerations

The following antenna requirements, specifications and site considerations should be met:

- Type of installation – indoor or outdoor
- Service area type and size
- Antenna type and characteristics
- Height
- Length and type of coaxial cable required for connecting the service antenna to the Repeater and the attenuation.

3.9.2 Indoor Installations Service Antenna Requirements

Determine the antenna installation configuration, according to the transmission requirements and the installation site conditions.

Installation requirements:

- An indoor antenna should be installed at a convenient location. It should be free of metallic obstruction.
- Install the Service Antenna at the designated height and tune it roughly toward the Service coverage area.

3.9.3 Outdoor Installations Service Antenna Requirements

For applications in which the Service/Mobile antenna is installed outdoors, the antenna type is chosen according to the available infrastructure (single-pole or horizontal installation). In addition, isolation between the donor and service antennas must be taken into account when selecting the location of the antennas.

4 Headend Elements Installation

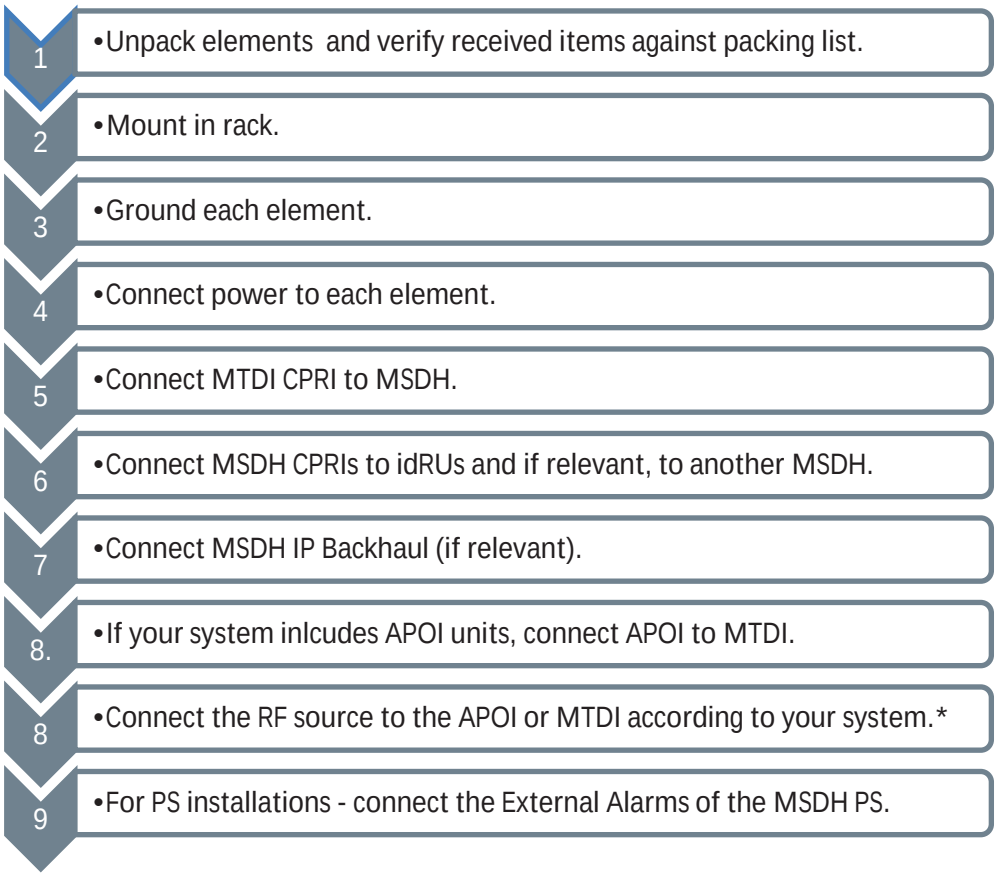
This chapter describes the installation of the following idDAS elements: APOI, MTDI and MSDH.

This chapter provides the following information

- Overview of the headend elements installation
- Unpacking and accessories provided with each type of element
- Rack mounting of headend elements
- MSDH connections including MSDH to MTDI connections
- For installations with APOI – APOI to MTDI
- RF source connections to idDAS APOI or MTDI according to the installation

4.1 Overview

NOTE: For cabinet ready installations, the ground and power for each element are preconnected in the cabinet. It is only required to connect the cabinet ground, and the cabinet power strip to the power source.



*RF sources can be connected to idDAS by following a detailed plan or via the idDAS web management BTS Port Wizard. The BTS Port wizard provides guidance to the valid connections.

4.2 Unpacking the Headend Units

4.2.1 General Instructions

Upon receiving each element/ unit, do the following:

- Examine the shipping container for damage before unpacking the unit.
- Perform a visual inspection to reveal any physical damage to the equipment.
- Verify that all of the elements listed in the shipping list are included.
- If any of the above conditions are not met, contact Cobham Wireless service representative.

4.2.2 APOI AC/48V DC Packing List

ITEM
X1 Flash Drive with documentation and driver for USB cable A to B (cable is not supplied)
X1 Cable RJ45 LSZH 1GBit CAT6 3m 180°
Green/yellow earth cable LSZH 300mm M4 Ring T.
For DC powered models:
X1 DC Power cable 2.5m
X1 Female connector 3.81mm, 4-Pin, 8A
For AC powered models, one or more of the following cables according to your region:
X2 power cables SAA/3-H05VVF3G1,00-C13/2.5M
X2 UK AC cables to C13 2.5M 250V/10A BLK
X2 USA AC power cable 125V 10A 1.5M
X2 power cables 250V 3x1mm Plug-C13 2.5

4.2.3 MTDI AC/48V DC Powered Packing List

ITEM
X1 Flash Drive with documentation and driver for USB cable A to B (cable is not supplied)
X1 Cable 2mm single-mode 9/125 DUP LC/LC 3m
X1 Cable 2mm multi-mode 50/125 DUP OM3 LC/LC 1.5m
X1 Cable RJ45 LSZH 10/100/1000 CAT6 1.0m
X1 Cable RJ45 LSZH 1GBit CAT6 3m 180 DEG
X1 Ground cable internal
For DC powered models:
X1 CABLE PWR DC DIST UNIT 2.5M
X1 Connector Female 3.81mm 4-Pin, 8A
For AC powered models, one or more of the following cables according to your region:
X1 CABLE POWER SAA/3-H05VVF3G1,00-C13/2.5M
X1 UK AC CBL TO C13 2.5M 250V/10A BLK
X1 USA AC POWER CABLE 125V 10A 1.5M

4.2.4 MSDH AC/48V DC Packing List

ITEM
X1 Flash Drive with documentation and driver for USB cable A to B (cable is not supplied)
X1 Cable RJ45 LSZH 1GBit CAT6 3m 180 DEG
For 48V DC powered models:
X1 Power cable DC distribution unit MSDH 2.5M
X1 Connector female 3.81mm 4-Pin, 8A
X1 Green/yellow earth CBL LSZH 300mm M4 Ring T.
For AC powered models, one or more of the following cables according to your region:
X1 Power cable SAA/3-H05VVF3G1,00-C13/2.5M
X1 UK AC power cable TO C13 2.5M 250V/10A BLK
X1 USA AC power cable 125V 10A 1.5M
For MSDH PS MSDH010 – NFPA Alarm Cable Assembly

4.2.5 Bespoke Headend Units Packing List

4.2.5.1 Bespoke APOI 12V DC Packing List

ITEM
X1 Flash Drive with documentation and driver for USB cable A to B (cable is not supplied)
X1 Cable RJ45 LSZH 1GBit CAT6 3m 180 DEG
X1 Green/Yellow Earth Cable LSZH 300mm M4 Ring T.
X1 Connector Female 3.81mm 4-Pin, 8A

4.2.5.2 Bespoke MTDI 12V DC Packing List

ITEM
X1 Flash Drive with documentation and driver for USB cable A to B (cable is not supplied)
X1 Cable RJ45 LSZH 10/100/1000 CAT6 1.0m
X1 Cable RJ45 LSZH 1GBit CAT6 3m 180 DEG
X1 Internal ground cable
X1 Connector Female 3.81mm 4-Pin, 8A
X1 Cable 2mm S.M 9/125 DUP LC/LC 3m
X1 Cable 2mm M.M 50/125 DUP OM3 LC/LC 1.5m

4.2.5.3 Bespoke MSDH 12V DC Packing List

ITEM
X1 Flash Drive with documentation and driver for USB cable A to B (cable is not supplied)
X1 Cable RJ45 LSZH 1GBit CAT6 3m 180 DEG
X1 BNC adapter SMA/MALE BNC/FEMALE
X1 Connector female 3.81mm 4-Pin, 8A
X1 Green/yellow earth cable LSZH 300mm M4 Ring T.

4.3 Mounting in Rack, Ground and Power Connections

This section provides instructions for mounting, powering and grounding individually supplied elements.

NOTE: For headend units that are pre-installed in a cabinet, follow the instructions provided with our cabinet for grounding and power connections to the cabinet.

4.3.1 Mounting Elements in the Rack

4.3.1.1 Headend Elements - Physical Specifications

Note the following:

- The operating temperature of all elements is -5 to +50°C.
- For the physical specifications of bespoke elements, refer to Section 4.3.4.

APOI	
Dimensions (w x h x d)	17.5" x 5.2" x 11.4" (445x 132x290 mm), (3U,19" rack)
Weight	VAC/48V DC models: 20 lbs (9 Kg)
MTDI	
Dimensions (w x h x d)	All models: 17.5 x 1.75 x 13.5 (445x45x342 mm), 1U, 19" rack
Weight	VAC and 48 V DC: 11.0 lbs (5.0 Kg)
MSDH	
Dimensions (w x h x d)	17.5" x 1.75" x 13.5" (445x45x342 mm)* 1U, 19" rack
Weight	VAC/48V DC models: 11 lbs (5.0 Kg)

*For MTDI Americas PS DC model, the MTDI depth dimension differs as follows: 17.5" x 1.75" x 13.8" (445x45x350 mm)

4.3.1.2 Rack Mounting Considerations

General Rack-mounting Criteria

- Verify the rack location meets criteria described in section 3.3.1.
- Referring to the element dimensions described in 4.3.1.1 and to Figure 4-1, plan the location of each element in the rack:
  - (Where relevant), DC power supply strip and power distribution unit should be located at the bottom of the rack.
  - For optimum connections, MTDI units should be located below APOI units
  - It is recommended to position MSDH below the lowest MTDI unit.
  - ***Allow for 1U brush for cable management above each APOI.***
- A-POI RF modules support a maximum power of 30dBm; to this end, Low PIM attenuation is required for BTS signals whose power level exceeds 30dBm.

The following figure illustrates a rack installation with *DC powered* MSDH and MTDI units (DC power connector on rear panel).

NOTE: APOI AC and DC power connections are located on the rear panel.

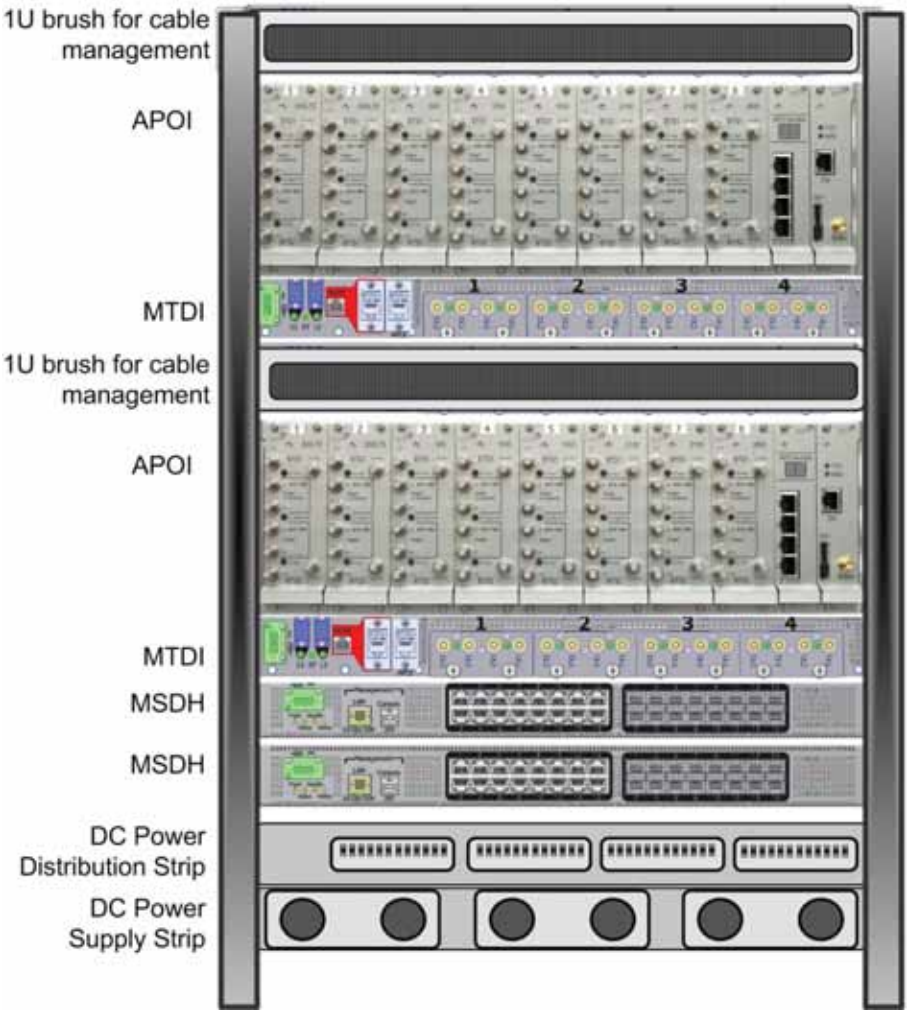


Figure 4-1. Example of Headend Rack Installation for DC powered MSDH and MTDI Units

4.3.2 Grounding APOI, MTDI and MSDH

ATTENTION!

- Refer to section 3.6 - Grounding Wire Requirements.
- Ground the unit according to the grounding standards required in your region.
- Make sure the grounding product used is suitable for the kind and size of cable being used.
- Connect the ground bolt to the same ground.
- Be sure the ground is connected before powering the equipment.

ATTENTION!

- *Se reporter à la section 3.6 - Grounding Wire* Requirements.
- *Rez l'unité selon les normes de mise à la terre requis dans votre région.*
- *Assurez-vous que le produit utilisé de mise à la terre est approprié pour le type et la taille du câble utilisé.*
- *Connectez le boulon de masse à la même mise à la terre.*
- *Assurez-vous que le câble de mise à la terre de l'équipement soit raccordé avant la mise sous tension*

Connect the GND to the ground lug located on the rear panels of the elements. The elements in the example below are AC powered.

NOTE: DC powered MTDI and MSDH support two ground lugs on either side of the rear panel. It is only required to connect one of the GND lugs.

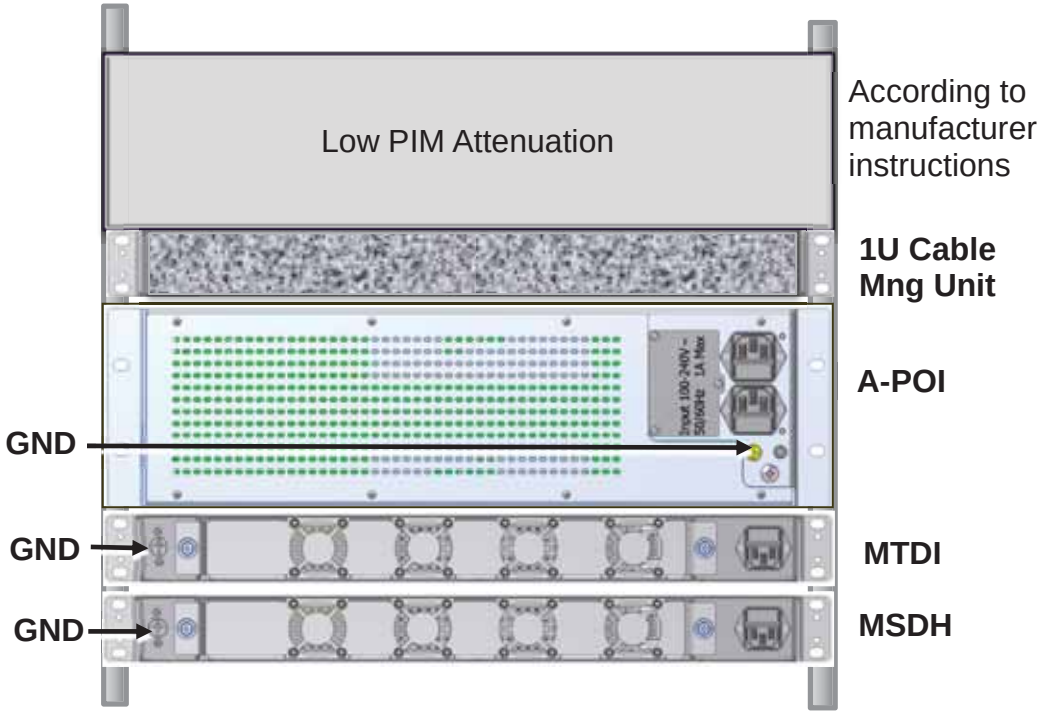


Figure 4-2. GND Lugs for idDAS Headend Elements – Located on Rear Panels

4.3.3 Powering A-POI, MTDI and MSDH

This section describes the power connections for AC and for DC powered headend elements.

4.3.3.1 AC Powering Headend Elements

⚠ CAUTIONS! • AC powered APOI, MTDI and MSDH may be supplied with one or more AC power cords: EU, United Kingdom, Americas and Australia. Use only the supplied power cord and use the power-cord relevant to your geographical location. • Be sure the equipment ground is connected before powering on the equipment.
⚠ PRUDENCE ! • *AC alimenté APOI, MTDI et MSDH peuvent être fournis avec un ou plusieurs cordons d'alimentation AC: UE, Royaume-Uni, Amériques et en Australie. Utilisez uniquement le cordon d'alimentation fourni et utiliser le cordon d'alimentation correspondant à votre zone géographique.* • *Assurez-vous que le câble de mise à la terre de l'équipement soit raccordé avant la mise sous tension*

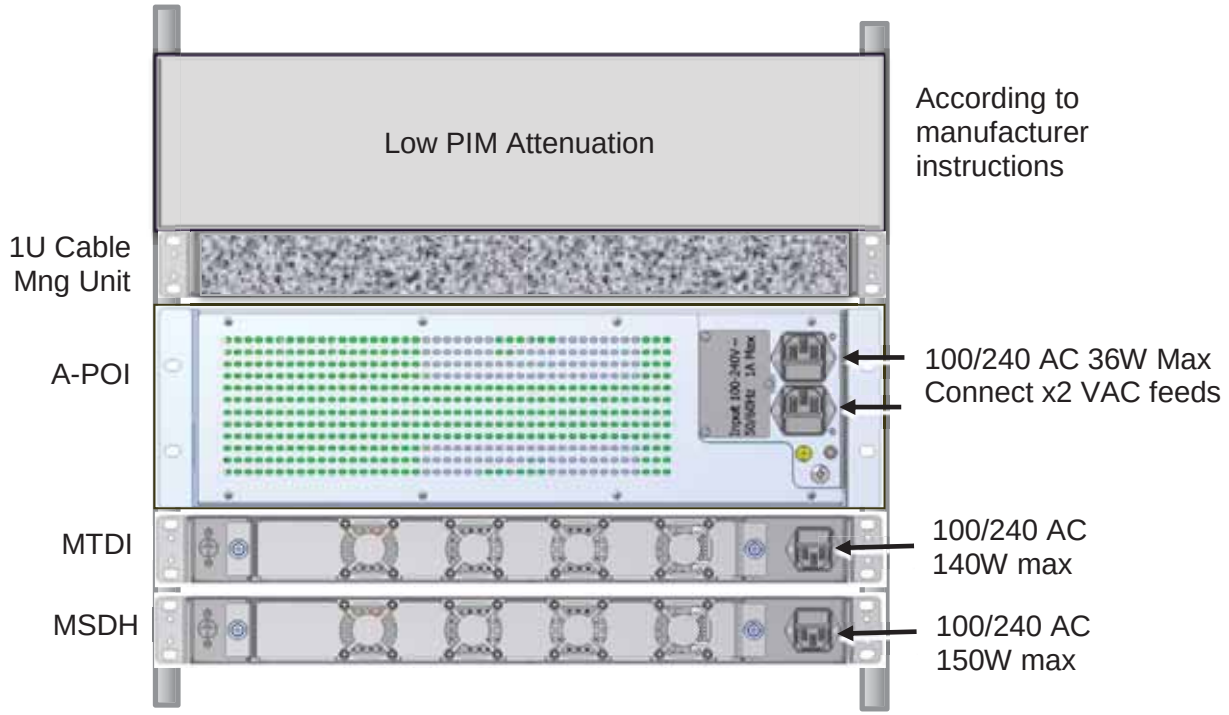


Figure 4-3. Illustration of APOI, MTDI and MSDH AC Power Connections

Connect the 100 – 240VAC power source to each element feed

- Refer to the power specifications in section 3.7.2.1.
- The available AC power cables are described in section 3.7.4.1.
- For the **APOI** unit, connect *both* power connectors.

4.3.3.2 48 V DC Powered Headend Elements

CAUTIONS!

- Be sure a CIRCUIT BREAKER meeting the instructions given in section 3.7.3 is connected near the shelf at an easily reachable and accessible location from the units.
- The units are powered ON and powered OFF via the circuit breaker.

PRUDENCE!

- *Assurez-vous d'un DISJONCTEUR prévu selon les instructions données dans la section* 3.7.3*, est relié à proximité du châssis, dans un endroit qui est facilement accessible et accessible à partir des unités.*
- *Les unités sont sous tension et hors tension par l'intermédiaire d'un disjoncteur.*

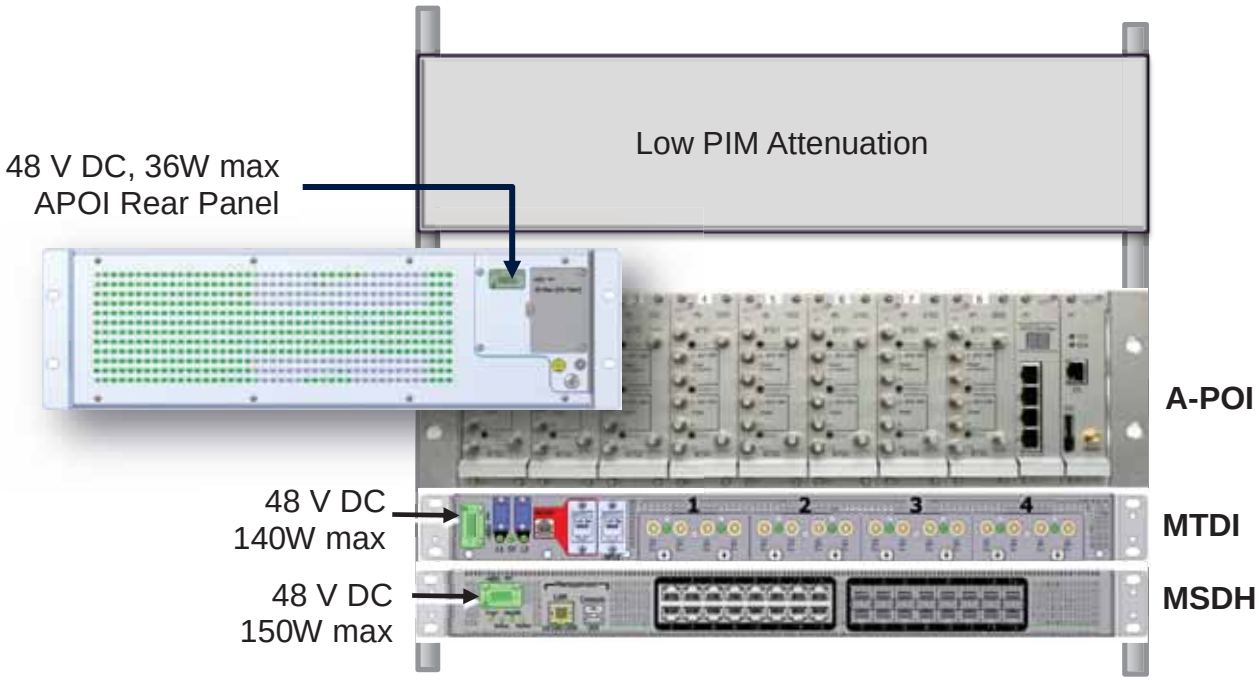


Figure 4-4. APOI, MTDI and MSDH 48 V DC Power Connections

CONNECTOR PINOUT	
	**Equipment DC Power Feeding**: 48V DC **APOI:** 2A max per feed; **MTDI/MSDH**: 3A per feed **Power Interface Pins** (numbered from left to right)**:** Pin 1,2 Positive (+) Pin 3,4 Negative (-) **For -48V DC Feeding:** • Connect Pin 1,2 to RTN (0V) • Connect Pin 3,4 to -48V DC **Terminal Connector specification:** Nominal current: 8A, Rated voltage 160 V

Connect the 48V DC power source to each element feed

- Refer to the power specifications in section 3.7.2.1.
- Use wires meeting specifications described in section 3.7.4.1.
  - Connect the wires to the provided connector.
  - Refer to the above DC connector pinout.

4.3.4 Bespoke Application Physical and Power Specification

4.3.4.1 Physical Specifications for Bespoke Elements

The following physical specifications are relevant to the 12V DC elements.

APOI	VALUES
Dimensions (w x h x d)	17.5" x 5.2" x 11.4" (445x 132x290 mm), 3U,19" rack
Weight	17.9 lb (8.1 Kg)
MTDI	
Dimensions (w x h x d)	17.5" x 1.75" x 13.5" (445x45x342 mm) 1U, 19" rack
Weight	9 lb (4.1 Kg)
MSDH	
Dimensions (w x h x d)	17.5" x 1.75" x 13.5" (445x45x342 mm) 1U 19" rack
Weight	12V DC models: 5.7 lbs (2.6 Kg)

4.3.4.2 Powering Bespoke Headend Elements

The powering procedure described in this section is relevant for bespoke 12V DC powered elements.

⚠ CAUTIONS!

- Be sure a CIRCUIT BREAKER meeting the instructions given in section 3.7.3 is connected near the shelf at an easily reachable and accessible location from the units.
- The units are powered ON and powered OFF via the circuit breaker.

⚠ PRUDENCE!

- *Assurez-vous d'un DISJONCTEUR prévu selon les instructions données dans la section* 3.7.3*, est relié à proximité du châssis, dans un endroit qui est facilement accessible et accessible à partir des unités.*
- *Les unités sont sous tension et hors tension par l'intermédiaire d'un disjoncteur.*

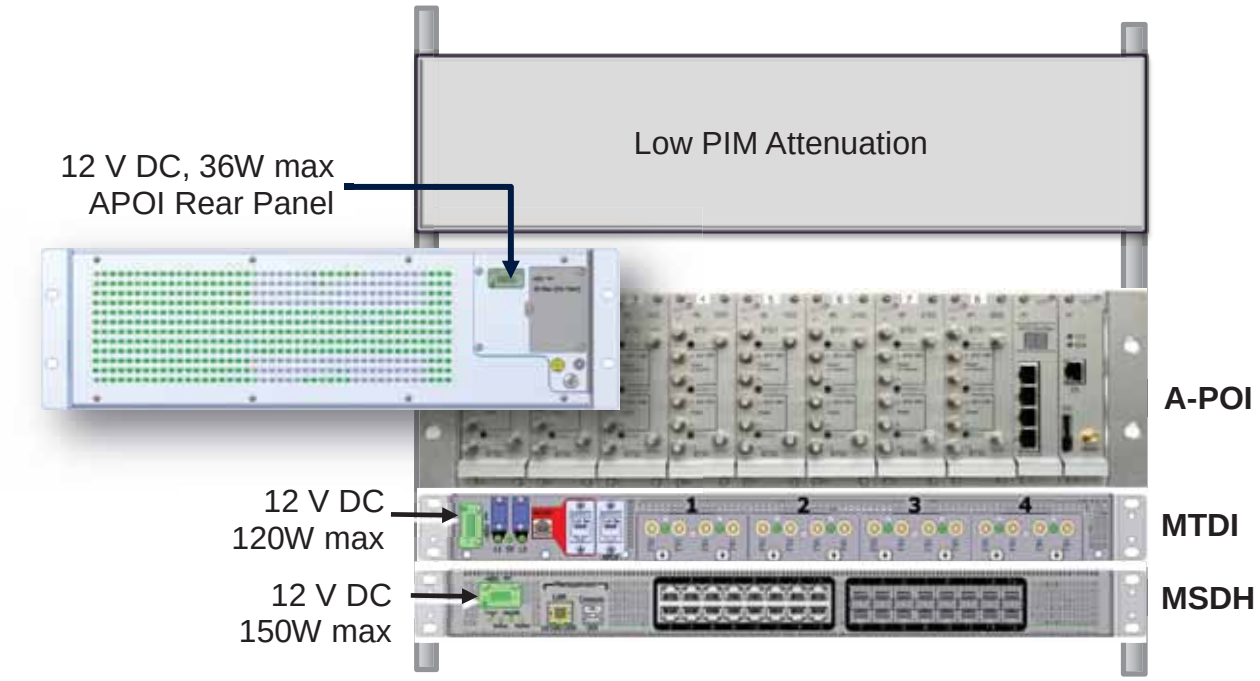


Figure 4-5. APOI, MTDI and MSDH 12 V DC Power Connections

Following are the specifications for the power connector and connections for all the 12V DC headend units:

CONNECTOR PINOUT	
	**Equipment DC Power Feeding**: 12V DC **APOI:** 3A max/feed; **MTDI**: 10A max/feed; **MSDH**: 12A max/feed; **Power Interface Pins** (numbered from left to right)**:** Pin 1,2 Positive (+); Pin 3,4 Negative (-) **For 12V DC Feeding:** • Connect Pin 1,2 to 12V DC • Connect Pin 3,4 to RTN (0V) **Terminal Connector specification:** nominal current: 8A, Rated voltage 160 V

To connect DC power for each elements

- Refer to the power specifications in section 3.7.2.
- Use wires meeting specifications described in section 3.7.4.1:
  - Connect the wires to the provided connector.
  - Refer to the above DC connector pinout.

4.4 MSDH Connections

This section provides the following information:

- How to install the MSDH SFPs
- MSDH to MTDI connections
- MSDH to idRU and backhaul connections – basic connections
- MSDH PS NFPA external alarms connections
- Master Slave MSDH Topology connections
- RF source redundancy driven MSDH connections
- Dual-system redundancy driven MSDH connections

4.4.1 Installing the MSDH SFP+ Modules

If the SFPs are not already installed in the MSDH, it is required to install *Cobham Wireless SFP+* modules in the MSDH unit CPRI ports that will be in use. See Section 8.4 for SFP part numbers and ordering information.

NOTE: In case of bi-directional SFP modules, be sure to use a matching SFP module pair.

⚠ CAUTION! It is recommended to detach any connected fibre-optic cables before installing the SFP+ module.
⚠ PRUDENCE! *Il est recommandé de détacher les câbles à fibres optiques qui sont connectés, avant d'installer le module SFP +.*

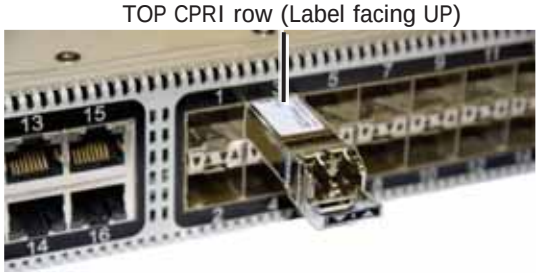
Figure 4-6. Cobham Wireless SFP+ Module

Continued on the next page…

To install the SFP+ module in the MSDH

NOTE: The SFP modules are installed in *opposing directions* in the MSDH CPRI slots top row and in the bottom row.

Cobham Wireless SFP+ in MSDH
TOP CPRI row (Label facing UP)



1. To insert the SFP+ modules in the MSDH CPRI *top* row:
   - Align the SFP+ module with the MSDH slot opening – SFP+ label facing UP.
   - Gently insert the SFP+ until it clicks into place.

2. To insert the SFP+ modules in the MSDH CPRI *bottom* row:
   - Align the SFP+ module with the MSDH slot opening – SFP+ label facing DOWN.
   - Gently insert the SFP+ until it clicks into place.

Cobham Wireless SFP+
Install in MSDH BOTTOM CPRI row
(Label facing DOWN)

4.4.2 MSDH to MTDI Connections

To connect the MSDH to the MTDI

Connect either the **MTDI SM (L1 port)** or the **MM (L2 port)** port to the corresponding SFP + module installed in one of the MSDH CPRI port:

- **L1** SFP = Multimode SFP+ transceiver 850nm 400m 10Gb MM LC
- **L2** SFP = Single Mode SFP+ transceiver 1310nm 10 km 10Gb SM LC

Recommendation for connections -

For more orderly connections and intuitive identification, it is recommended to connect the lower CPRI ports (i.e. CPRI Ports 1, 2, 3 etc.) to MTDI units or to an additional MSDH unit if relevant. The higher or remaining CPRI ports can then be connected to remote units.

Figure 4-7. Example of MSDH to MTDI Connections

4.4.3 MSDH to idRU and IP Backhaul Connections

This section details the basic connections between the MSDH and hosted idRUs. For more information on connecting the idRUs according to a specific topology such as Master Slave, or RF Source Redundancy, refer to Section 5.6.3.

The MSDH CPRI ports provide the interface and route the RF resources towards the connected idRU. This may be a single idRU, or the first idRU in the cascade or 'string'. Any data from MSDH backhaul ports (that are connected to a router), is automatically forwarded to the parallel CPRI ports. This is illustrated in Figure 4-8 as follows:

- Ethernet backhaul is connected to MSDH **Ethernet** Port-14, Port-15, and Port-16.
- The backhaul data will be routed to the idRUs connected to MSDH **CPRI** Port-14, Port-15, and Port-16.

Note that in the example, the idRU connected to CPRI Port-13 will not receive data since Ethernet Port-13 is not connected to the backhaul.

To connect the idRUs to the MSDH

- Connect each idRU to the CPRI port on the MSDH according to your site plan.
- To provide IP backhaul to any idRU, connect the parallel IP Backhaul port to a router.

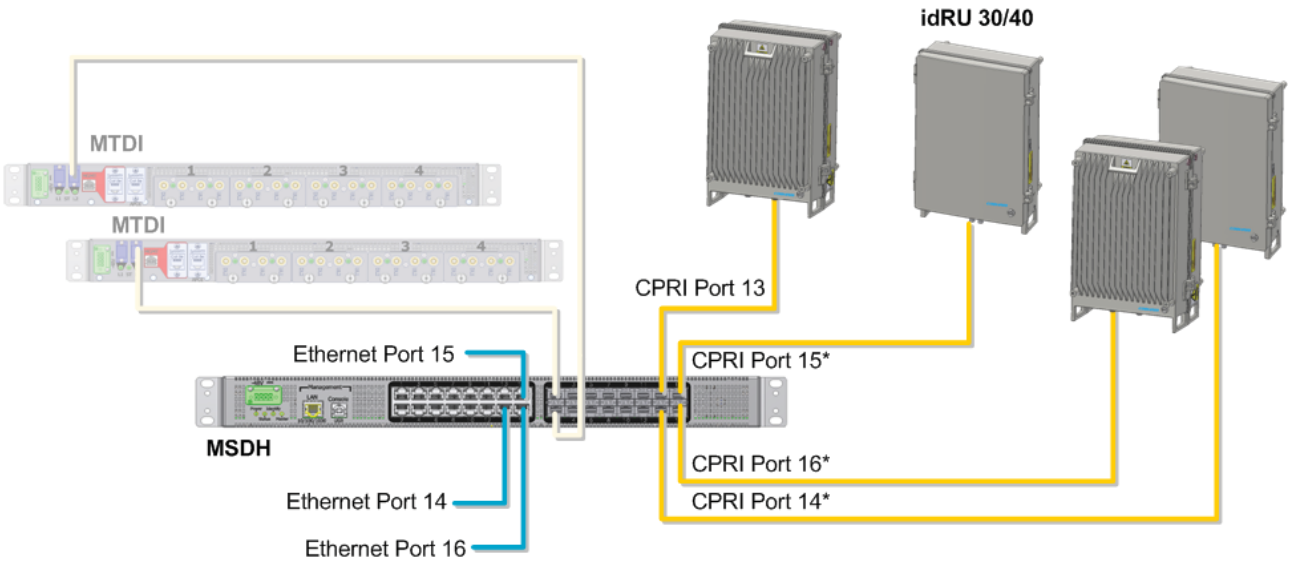


Figure 4-8. idRU to MSDH CPRI Connections with IP Backhaul Support

(*) Receives IP backhaul from corresponding Ethernet ports

4.4.4 MSDH PS NFPA Output Alarm

idDAS PS MSDH supports one General alarm relay that is triggered if any of the MSDH alarms are activated. The alarm status is reflected by the **General** indicator in the **Master MSDH** window – see Figure 4-11.

The user may choose to disengage specific alarms from the relay as described in Section 4.4.4.2.

NOTE: For the part numbers of the relevant MSDH units, refer to Section 8.1.2.2.

4.4.4.1 MSDH Relay Connections

The MSDH relay is implemented by a 4-pin circular Binder-type external connector located on the MSDH rear panel.

To connect the alarm

1. Use the alarms cable provided in the accessories kit (Section 4.2.4).

Figure 4-9 MSDH Public Safety Output Alarm Connections

2. Connect the wires to the output source as normally open or normally closed, according to the pinout table below.

PIN	SIGNAL NAME	DESCRIPTION
1	General Alarm Common	Red
2	General Alarm Normally Open	Green
3	General Alarm Normally Closed	White
N/A	----	Black

NOTE: No additional activation or configuration operations are required unless you wish to disengage any of the alarms from the relay.

4.4.4.2 MSDH General Alarm Filtering

To filter out MSDH alarms affecting the relay

1. Select the MSDH **Alarms Configuration** hover-menu option.
2. Click the **Advanced** button.
3. Under **Dry Contact**, uncheck the required alarms to disengage them from the relay.
4. Click **Apply**.

Figure 4-10. Filtering Alarms Associated with the Relay

4.4.4.3 MSDH General Alarm Monitoring

As illustrated in Figure 4-9, the MSDH General alarm can be connected as Normally Open or Normally Closed. It is triggered if any of the MSDH alarms are activated. The summarized status of the General alarm is displayed in the **Master MSDH** hover-menu window.

The MSDH General alarm is affected by default by all MSDH alarms, including the RRU alarms. The alarms can be filtered as described in Section 4.4.3.

The alarms can be filtered at the MSDH level via the MSDH Alarm Configuration screen. Thus, even if an RRU parameter activates the RRU General alarm, it will only activate the MSDH General alarm indicator (Figure 4-11) if the specific parameter was not disabled at the MSDH level.

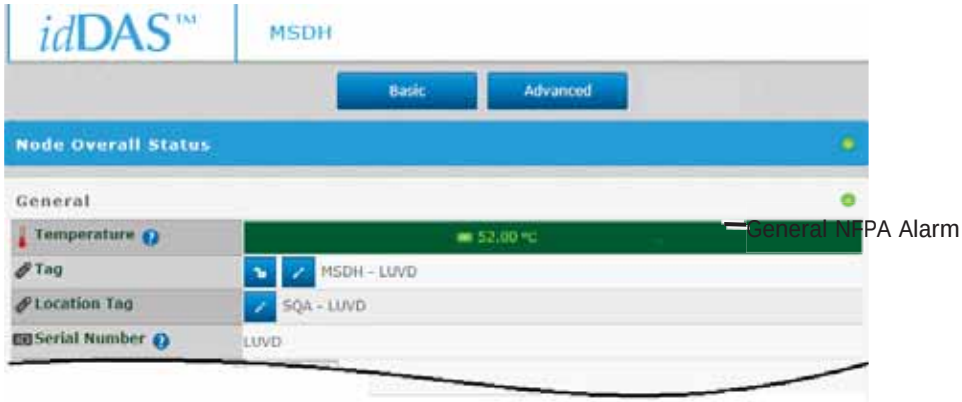


Figure 4-11 Partial Master MSDH Window Showing the General Indicator

4.4.5 MSDH Topologies Connections

This section summarizes the MSDH connections required for the following topologies:

- Master Slave
- RF source redundancy

4.4.5.1 Master Slave MSDH Topology Connections

In a Master Slave configuration, two MSDH units are interconnected via any of the CPRI ports. The topology is illustrated in Figure 4-12. The RF feed to the MSDH units can be as follows:

- A dedicated MTDI connected to each MSDH
- A single MTDI connected to the Master MSDH

NOTE: During the setup procedure, one of the MSDH units is designated as Master and the other as Slave, taking into consideration the physical setup.

To connect a Master Slave topology

1. MSDH to MSDH connections:
   - Connect a CPRI port on the **Master MSDH** to any CPRI port on the **Slave MSDH**.
   - For order and clarity, it is recommended to use the lower numbered CPRI ports.
2. MTDI connections:
   - Connect the MTDI L1 or L2 port (according to your installation) to a CPRI port on the designated **Master MSDH**.
   - If your installation includes a dedicated MTDI per MSDH, connect the second MTDI to a CPRI port on the designated Slave MSDH.
   - For order and clarity, it is recommended to use the lower numbered CPRI ports on the MSDH.
3. idRU connections:

   Connect the CPRI port of each single idRU or the first idRU in the cascade to the designated Master or Slave MSDH according to the site plan.

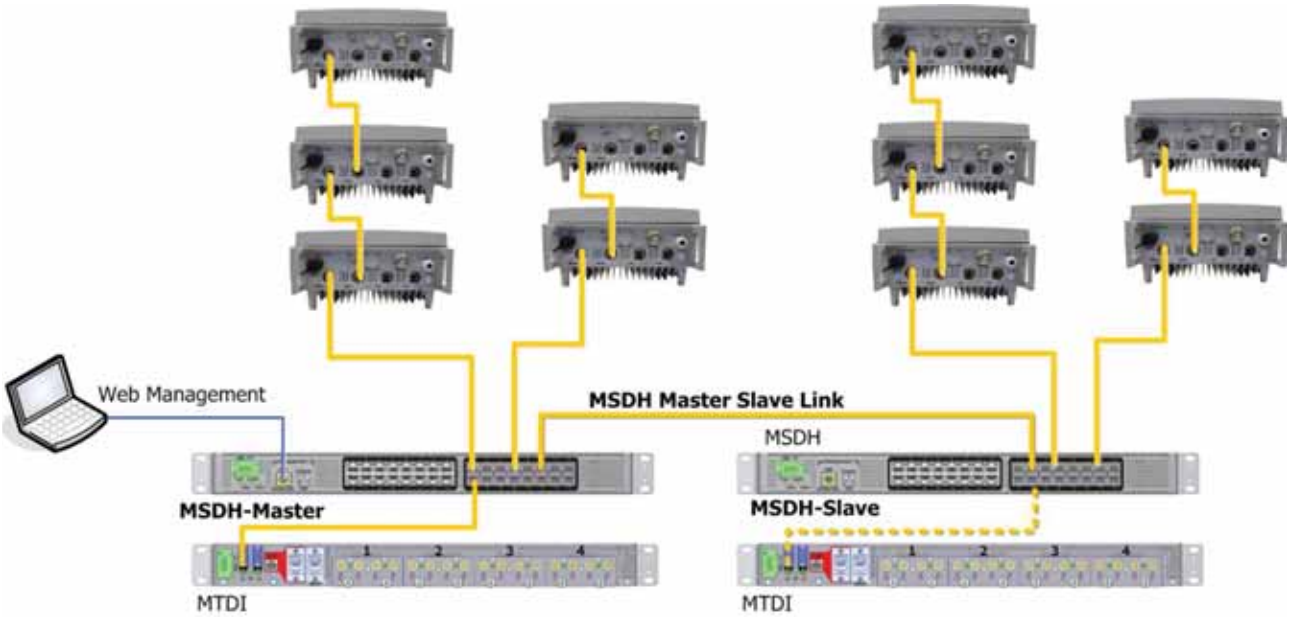


Figure 4-12. Example of a Master Slave Topology

4.4.5.2 RF Source Redundancy Driven Topologies MSDH Connections

This section describes the MSDH connections for an RF source redundancy driven topology. In this type of topology, each string of idRUs is connected to two RF supply chains – one at each end of the cascade.

The MSDH units in each RF supply chain can located at a distance of up to 40 km from each other, and are interconnected via an Ethernet connection. For an overview and detailed description of the topology, refer to Section 2.4.1. The topology is illustrated in Figure 4-13.

NOTE: The required setup parameters are defined during the commissioning procedure.

To connect a redundancy topology

1. MSDH to MSDH synchronization connections:
   - Connect a CPRI port on the designated **Primary MSDH** to a *parallel* CPRI port on the designated **Secondary MSDH**. For example, CPRI Port-1 to CPRI Port-1.
   - For order and clarity, it is recommended to use the lower numbered MSDH CPRI ports.
2. MTDI connections:
   - Connect **L1** or **L2** port on the designated **Primary MTDI** to any CPRI port on the designated **Primary MSDH**.
   - Connect **L1** or **L2** port on the designated **Secondary MTDI** to any CPRI port on the designated **Secondary MSDH**.
3. Connect each idRU 'string' as follows:
   - Connect the **Main CPRI** port of the outer **idRU** adjacent to the **Primary MSDH** to any CPRI port on the **Primary MSDH**.
   - Connect the **AUX CPRI** port of the outer **idRU** adjacent to the **Secondary MSDH** to any CPRI port on the **Secondary MSDH**.

Below is an example of an RF source redundant topology.

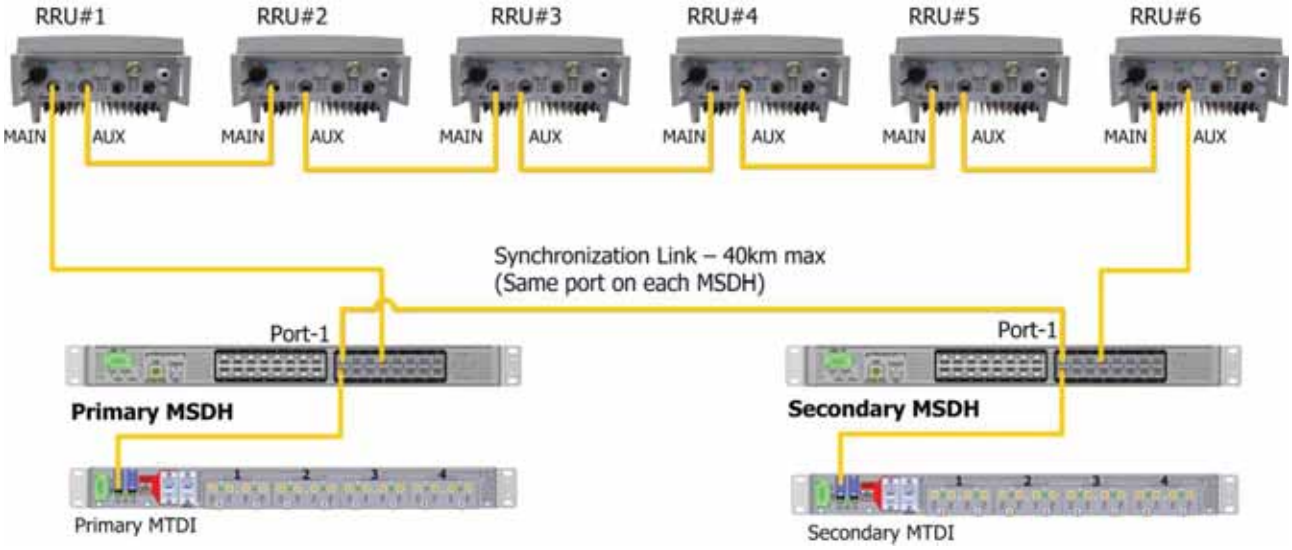


Figure 4-13. Physical Connections of the RF Source Redundant idDAS Systems

4.4.5.3 Dual-System Redundancy Driven Topologies MSDH Connections

This section describes the MSDH connections for a dual-system redundancy driven topology. In this type of topology, two complete and independent systems are installed and powered-up, but only one system will be transmitting RF at any one time. For more information on the dual-system redundancy topology, refer to Section 2.4.2.

To install the MSDH in a dual-system redundancy driven topology

- Install the MSDH for each system according to the standard MSDH installation procedures described in Sections 4.4.1, 4.4.2, and 4.4.3.
- Connect the MSDH rear panel alarms as described Section 4.4.4.

NOTE: No further connections are required at this time. During the commissioning procedure described in the idDAS Commissioning Guide, the required setup parameters will be defined and the MSDH units will be connected to the network.

Below is an example of an RF source redundant topology.

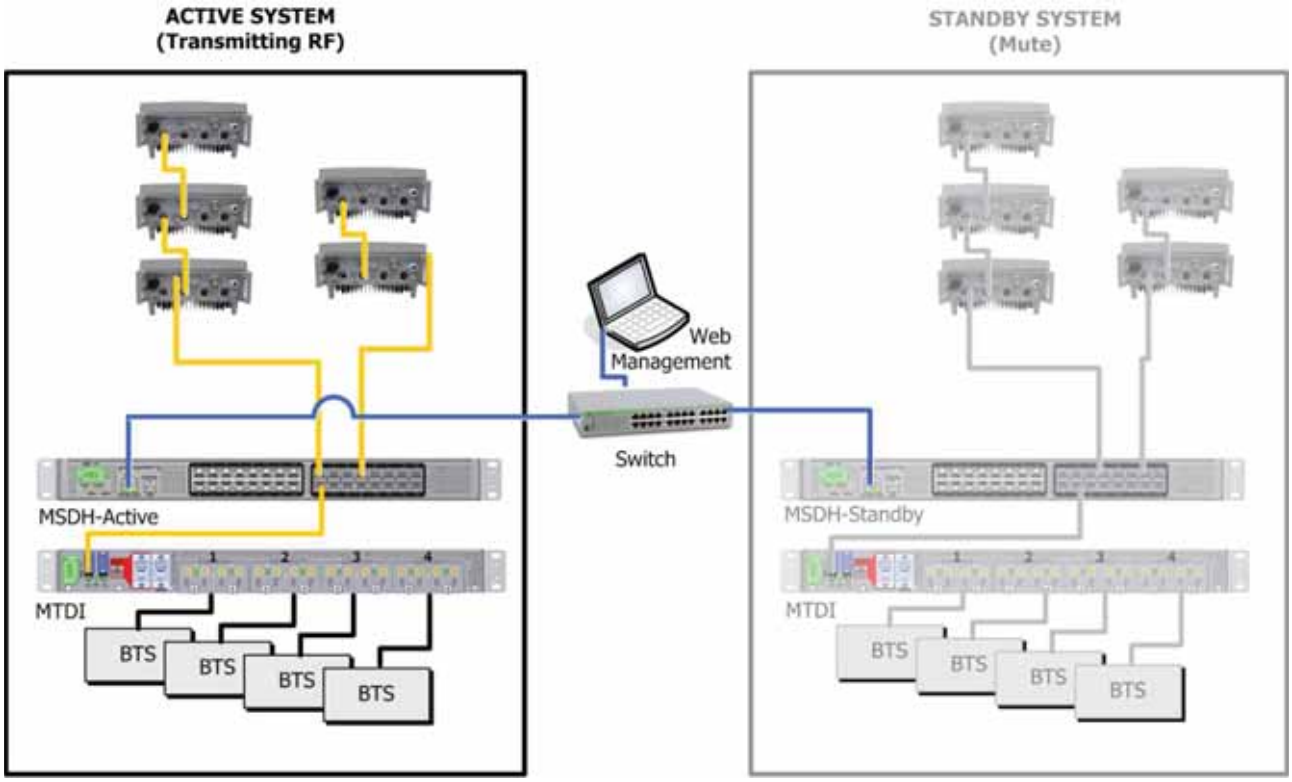


Figure 4-14. idDAS Dual-system Redundancy Topology

4.5 RF Source to idDAS Connections

This section details the RF source to APOI and to MTDI connections. Depending on the size of your system and your familiarity with the idDAS elements, you may either directly perform the connections according to your plan or open an Admin level session to the MSDH and use the BTS Port Wizard tool. The tool is briefly described in Section 4.5.3 and detailed in the *idDAS Web Management Guide*.

4.5.1 BTS Port Setup - BTS to APOI RF Connections

This section describes the following RF connections along with the relevant considerations:

- BTS to APOI
- APOI to MTDI

4.5.1.1 BTS to APOI RF Connections

⚠ CAUTION!

- All band module services are set to OFF by default. Do NOT enable any services until all connections and commissioning procedures are complete.
- Max input power from BTS: 30dBm (reduce higher input power using either external attenuators or by configuring a lower power (where possible)).
- If necessary, use Low PIM attenuators between the BTS (DL ONLY for simplex connections).

⚠ PRUDENCE!

- *Par défaut, tous les services du module de bande sont réglés sur OFF. Ne pas activer les services jusqu'à ce que toutes les connexions et les procédures de mise en service sont complètes.*
- *La puissance maximale qui est entré à partir de BTS: 30dBm (puissance d'entrée qui est plus élevé doit être réduite en utilisant soit des atténuateurs externes ou en configurant une puissance plus faible (si possible)).*
- *Si nécessaire, utilisez atténuateurs Low PIM entre le BTS (DL SEULEMENT pour les connexions simplex).*

Note the following:

- Each A-POI conditioning card supports two same-band channels with dedicated BTS connections.
- Each module supports dedicated SIMPLEX and DUPLEX BTS connections for each sub-band.
- **For LTE 700, Channel-1 is the UPPER Band and Channel-2 is the LOWER band.**
- Below is an overview of the BTS to APOI connections.

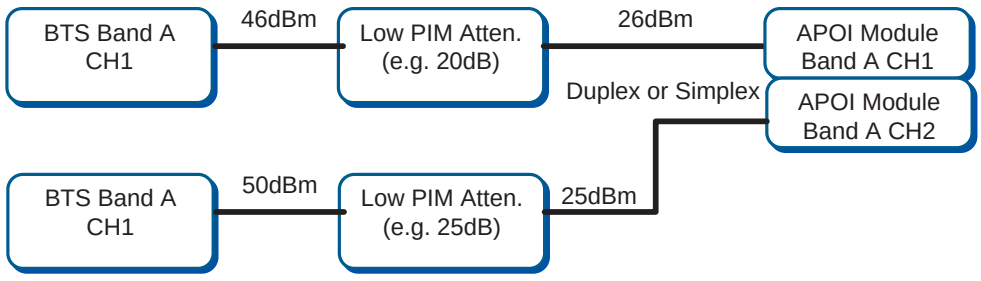


Figure 4-15. Example of Connection of BTS Channel to the Corresponding A-POI Channel port

4.5.1.2 BTS to APOI Simplex Connections

Referring to your installation plan for the connections:

1. Connect the BTS simplex connections:
   - **BTS UL** to Band Module **UL**
   - **BTS DL** to Band Module **UL/DL**
2. For BTS DL > 30dBm, use a Low PIM attenuator.

Note the following:

- For Simplex connections requiring attenuation, only the DL signal is attenuated to the duplex port.
- Verify that the UL BTS interface signal strength corresponds in gain value to the DL BTS interface gain value.

  This can be done using the UL Offset gain parameter during the commissioning procedure for the channel, or by physically reducing the UL signal by external attenuator.

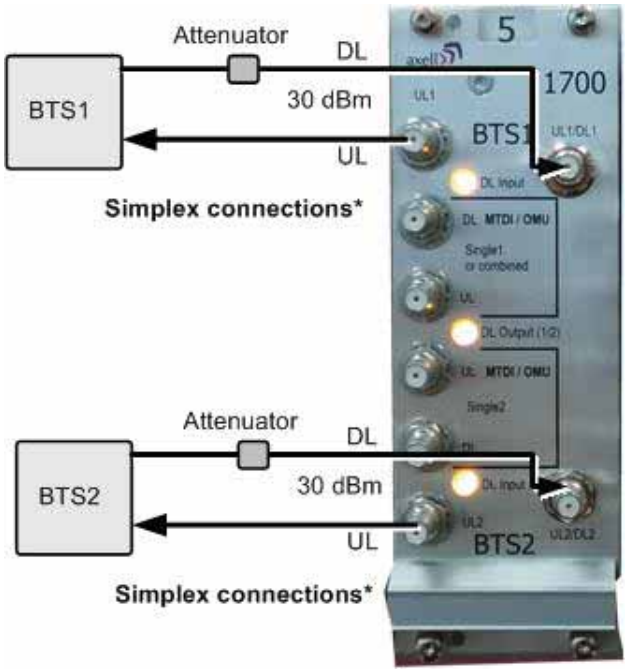


Figure 4-16. BTS Simplex Connections

4.5.1.3 BTS to APOI Duplex Connections

Connect the BTS duplex connections:

- **BTS UL/DL** to Band Module **UL/DL**
- If BTS output > 30dBm (you can use a Low PIM attenuator for BTS output > 30dBm).

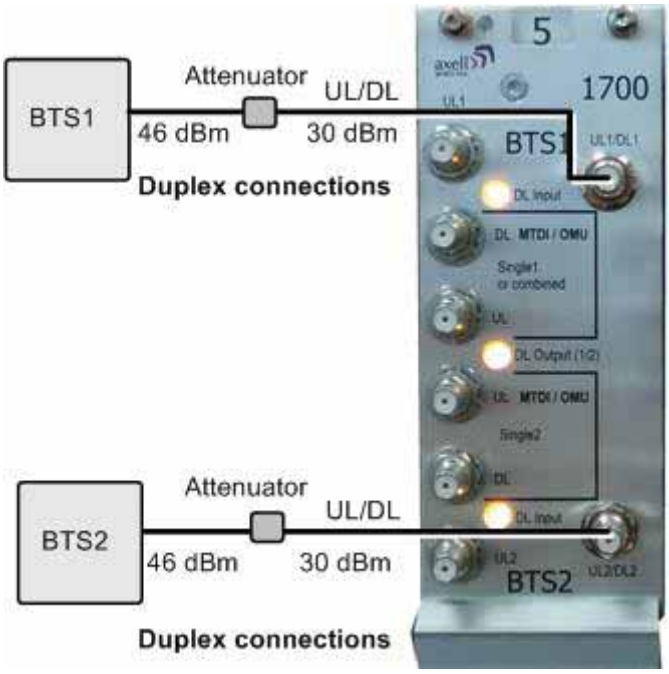


Figure 4-17. BTS Duplex Connections

4.5.2 A-POI to MTDI RF Connections

The two A-POI channels on each APOI Band Module are combined; as such, the frequencies must be of different ranges within the band.

As illustrated in Figure 4-18, the two combined APOI bands are physically routed towards as single MTDI channel. This enables each MTDI module to support up to four APOI channels.

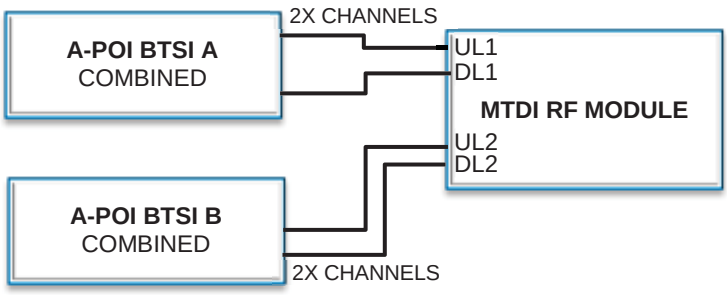


Figure 4-18. Block Diagram Example of Four (Same-band) sector connections to MTDI Module

To connect combined A-POI interfaces to the MTDI band module

Connect only the top channels in each module as follows:

APOI BAND MODULE PORTS	(SAME BAND) MTDI BAND MODULE PORTS
1st Band Module - **Top** (only) UL and DL	UL1 DL1
2nd Band Module - **Top** (only) UL and DL	UL2 DL2

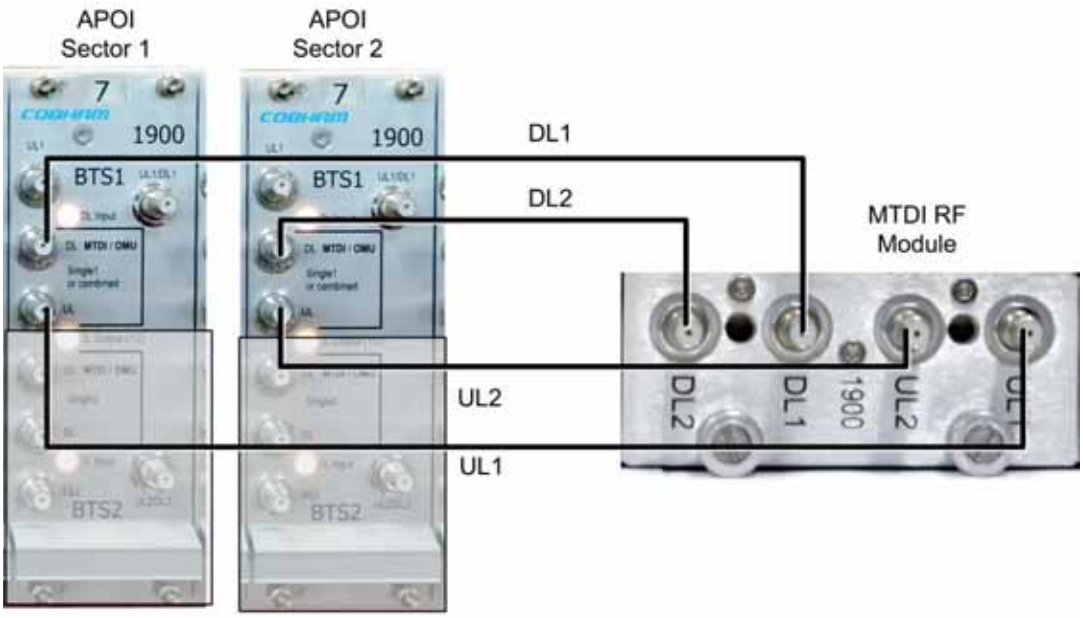


Figure 4-19. Example of Combined Sub-Band Connections between A-POI and MTDI Modules

4.5.3 Wizard Guided RF Connections

The BTS Port Wizard is a tool provided by the idDAS Web Management. It can be used to facilitate the installation procedure by guiding you through the connections between the RF source and the APOI and MTDI. This ensures that the registered BTS Ports correspond to the physical connections.

The BTS Port Wizard is accessed by opening an MSDH session. The tool is detailed in the idDAS Web Management Guide.

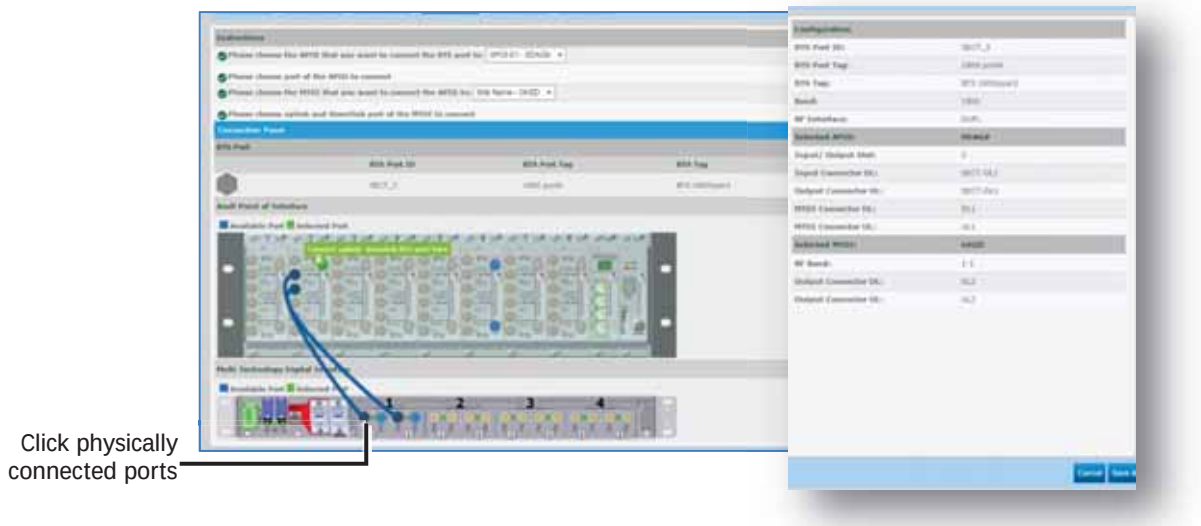


Figure 4-20. Valid APOI to MTDI Connection

4.5.4 MSDH to idRU Connections

NOTE: In order to interconnect MSDH and idRUs, matching SFPs must be installed in elements on either side of the link.

To connect idRUs to the MSDH

Recommendation for connections

- For more orderly connections and intuitive identification, it is recommended to connect idRU CPRI cables to the higher numbered CPRI ports in the MSDH – i.e. Ports 16 and down to the available ports.
- The first ports are used for connecting to another MSDH – in case of Master Slave topology, and to MTDI equipment.

Below is an example of a basic configuration consisting of two MTDIs and a number of remotes. In this configuration, up to 14 remotes can be connected on Ports 3 to 16.

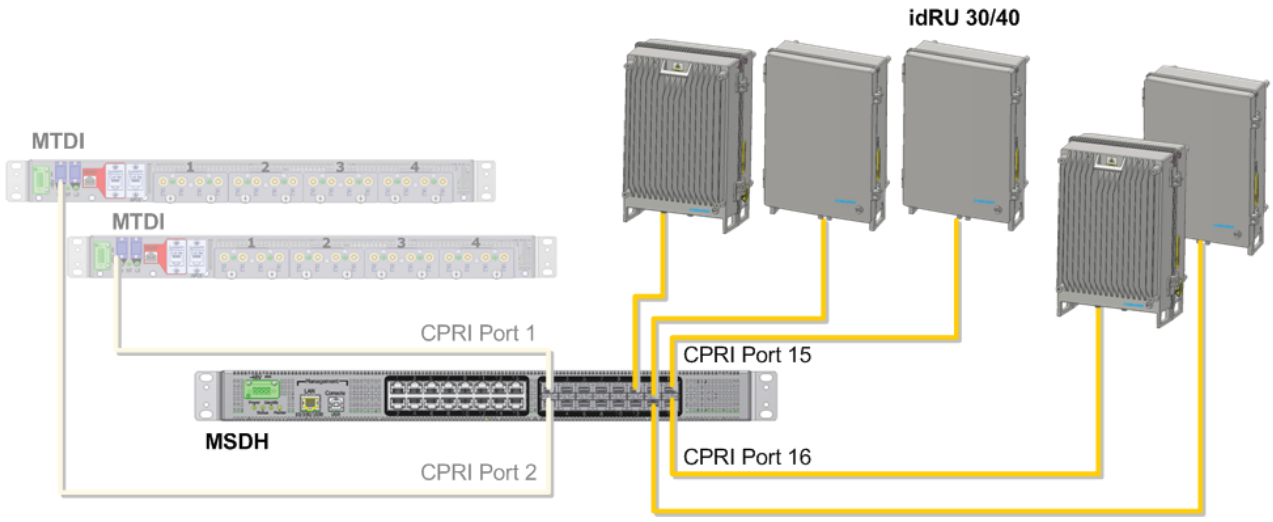


Figure 4-21. Example of idRU to MSDH Connections

5 idRU Installation

This chapter includes the following information:

- idRU safety guidelines
- Unpacking and package contents
- idRU 40 fan hood assembly
- Rack-mount procedure
- Wall-mount procedure
- Basic connections
- Connections of cascaded idRUs and various topologies
- Dry-contact alarms connections

5.1 Warnings and Safety Guidelines

Before installing the idDAS elements review the following safety information:

- Follow all local safety regulations when installing the idDAS system elements.
- The installation is to be conducted by qualified service personal according to local and national installation code.
- Follow Electro-Static Discharge (ESD) precautions.

⚠ CAUTION! **Safety to personnel**

- Please be aware that the idRU equipment may, during certain conditions become very warm and can cause minor injuries if handled without any protection, such as gloves.
- The idRU is heavy. Two people or a crane may be required for lifting.

⚠ PRUDENCE! ***Sécurité au personnel.***

- *S'il vous plaît être conscient que le idRU équipement peut, dans certaines conditions devenir très chaud et peut causer des blessures mineures en cas de manipulation sans protection, comme des gants.*
- *Le idRU est lourd. Deux personnes ou une grue peuvent être nécessaires pour le levage.*

Figure 5-1. idRU Heavy Warning Label

⚠ ATTENTION!

- *It is required to open the idRU only if the installation requires connecting External Alarms* or it is necessary to access the management GUI to diagnose problems; all other interfaces external.*
- The repeaters are secured with two hex screws (M8) and can also be locked with a key.
- The two screws must be fully tightened. Failure to do so may affect the IP66 compliancy and therefore any warranty.

⚠ ATTENTION!

- *Il est nécessaire d'ouvrir le idRU que si l'installation nécessite la connexion des alarmes externes ou il est nécessaire d'accéder à l'interface graphique de gestion pour diagnostiquer les problèmes; toutes les autres interfaces sont accessibles depuis l'extérieur.*
- *Les répéteurs sont verrouillées avec deux vis à tête hexagonale (M8) et peuvent également être verrouillés avec une clé.*
- *Les deux vis doivent être serrées. Ne pas le faire peut affecter la conformité IP66 et cela affectera la garantie.*

*For PS NFPA idRU models, it is not required to open the repeater as the external alarms are connected directly to the front panel connector.

Figure 5-2. Securing idRU 30

Figure 5-3. Securing idRU 40

5.2 PS NFPA idRUs Installation Instructions

For Public Safety NFPAs NEMA 4 ready idRUs:

- Use tubing meeting the specifications detailed in Section 3.2.1, for all connected CPRI and ETH idRU connections. Unused Ethernet and CPRI ports are plugged as described in Section 5.6.5.
- idDAS public repeaters support a Binder-type external alarms connecter and additional alarms as described in Section 5.7.2.

5.3 Unpacking and Package Contents

This section lists the package contents for two type of idRU installations:

- idRUs with standard brackets (without fan hood)
- idRUs with fan-hood brackets

5.3.1 Unpacking

Upon receiving the idRU Repeater perform the following:

1. Examine the shipping container for damage before unpacking the unit.
2. Perform a visual inspection to reveal any physical damage to the equipment.
3. Verify that all of the equipment (listed below) is included. Otherwise contact Cobham Wireless service representative.

5.3.2 Accessories for idRUs with Standard Brackets

ITEM
X1 Flash Drive with documentation and driver for USB cable A to B (cable is not supplied)
x2 RJ45 LSZH cable, CAT6,1 Gbit, 3 m, 180 degrees
For AC models – one or more of the AC cables may be provided, according to your region: • UK AC external cable assembly with Binder connector • EU AC external cable assembly with Binder connector • US AC external cable assembly with Binder connector
For DC models: • idRU 30 — U.S. DC external cable assembly with 7-Pole Binder connector (P/N DC00219) • idRU 40 — DC external cable assembly with 4-Pole Binder connector (P/N 40WVC7900)
x2 Brackets — support both wallmount and rack mount options
x4 M8x16 Screws, hex head, stainless steel
x1 Drill Template — used for marking wall mount drilling holes
x4 3/8” Jumbo Anchor Bolts, zinc plated — used for wallmount installations
x2 Plugs and O-rings — for plugging up to two unused Ethernet and AUX fibre ports: • Plug — threaded blanking plug, M32x1.5 mm, nickel plated, IP68 • O-ring — M32x2 mm, NBR, black

5.3.3 Accessories for idRUs with Fan Hood

ITEM
X1 Flash Drive with documentation and driver for USB cable A to B (cable is not supplied)
x2 RJ45 LSZH cable, CAT6,1 Gbit, 3 m, 180 degrees
x1 Drill Template — used for marking wall mount drilling holes
x4 3/8" Jumbo Anchor Bolts, zinc plated — used for wallmount installations
x2 Plugs and O-rings — for plugging up to two unused Ethernet and AUX fibre ports: • Plug — threaded blanking plug, M32x1.5 mm, nickel plated, IP68 • O-ring — M32x2 mm, NBR, black
Fan Hood Assembly: • x2 Mounting Brackets • x1 Front fan-hood assembly Cobham logo shield • x1 Rear fan-hood shield assembly • x8 M8x16 Screws, Hex head, stainless steel • x8 M8 spring washers, DIN 7980, A2 Stainless
For AC models – One or more of the AC cables may be provided, according to your region: • UK AC external cable assembly with binder • EU AC external cable assembly with binder • US AC external cable assembly with binder
For DC models
• DC external cable assembly with 4-Pole Binder connector
For Public Safety models
• 10-pin external alarm for NFPA cable assembly

5.4 Brackets and Fan-Hood Assembly

Depending on the model and the cooling requirements, repeaters are either provided with standard brackets, or with a fan-hood and the relevant accessories and brackets designed for the fan-hood.

This section provides the following information:

- Standard bracket assembly for rack and wall mount installations
- Fan-hood assembly – for repeaters that include fan-hood.

NOTE: In addition to the mounting brackets or fan-hood assembly, it is recommended to use fixings as described in section 5.5.2.3 in order to further secure the mount.

5.4.1 idRU No Fan-hood Brackets Assembly

This section is relevant for repeaters without a fan-hood. The provided brackets are used for both wall mount and for a rack mount procedure, where the bracket position differs according to the type of installation.

NOTE: The installation requires x4M8 washers – not supplied with the repeater.

To assemble the brackets

1. Position the brackets according to the type of installation:
   - For Rack mount – refer to Figure 5-4.
   - For Wall mount – refer to Figure 5-5.
2. Use the x4 (provided) **M8 x16 Screws** and **X4 Spring Washers** (not provided) to assemble the brackets.

Figure 5-4: Rack-mount bracket position

Figure 5-5. Wall Mount Bracket Position

5.4.2 idRU Fan Hood Assembly

For repeaters that include a fan-hood (usually these are idRU-40 repeaters), it is required to assemble the fan hood onto the repeater before the repeater is mounted.

⚠ WARNINGS!

- This installation requires two people.
- Assemble the fan hood ONLY on the repeaters with which it is supplied and designated.

5.4.2.1 Assembly Overview and Dimensions

The fully assembled system is displayed in Figure 5-6, for reference. The dimensions are displayed in Figure 5-7. The parts list and assembly instructions are provided in the following sections.

Figure 5-6. idRU with Front and Rear Fan Hoods

The dimensions of the assembled repeater with the fan hoods are given below.

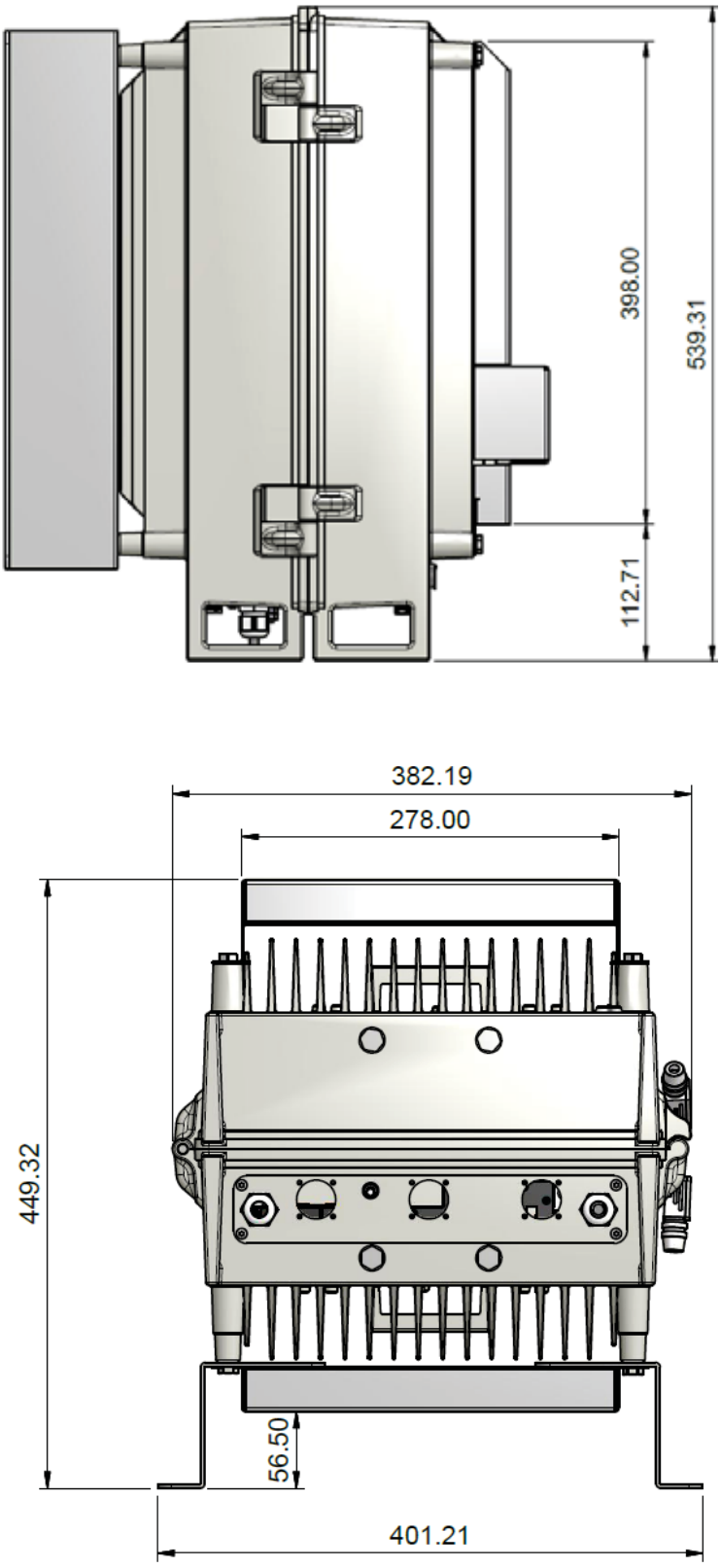


Figure 5-7. idRU with Fan Hood Assembly Dimensions

5.4.2.2 idRU-40 Fan Hood Assembly

This section describes how to assembly the fan hood onto idRU-40 repeaters.

1. Place the repeater on a flat surface with the repeater door panel facing down and the interfaces towards you.

> ⚠ WARNING! Be sure to start with this phase – otherwise, the assembly may be damaged.

2. Loosely assemble the mounting brackets — the position differs depending on whether this is a wall mount or a rackmount, where Figure 5-8 shows position for wallmount:
   - Align innermost bracket holes to repeater mounting holes.
   - Loosely insert four bolts and washers.

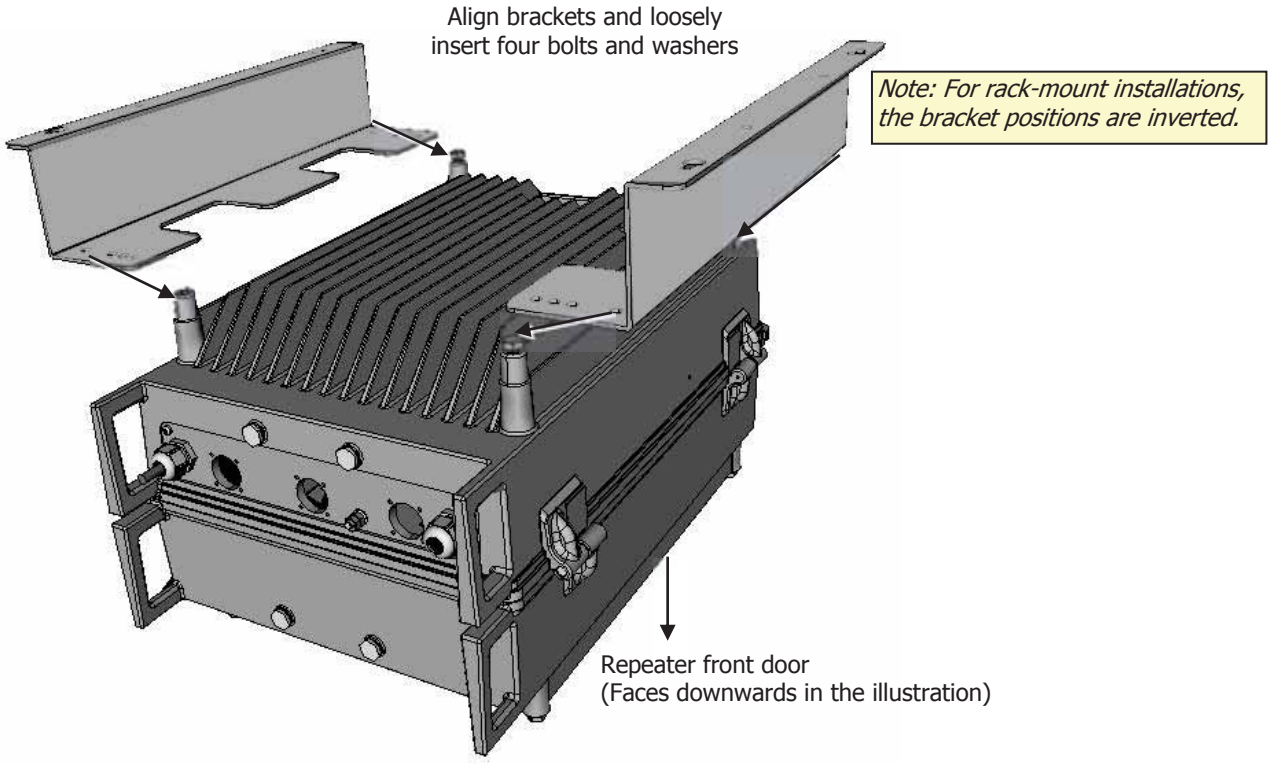


Figure 5-8. Positioning Brackets

3. Assemble the rear fan hood:
   - Position the rear fan hood under the (inserted) bolts and washers.
   - Tighten the four bolts.

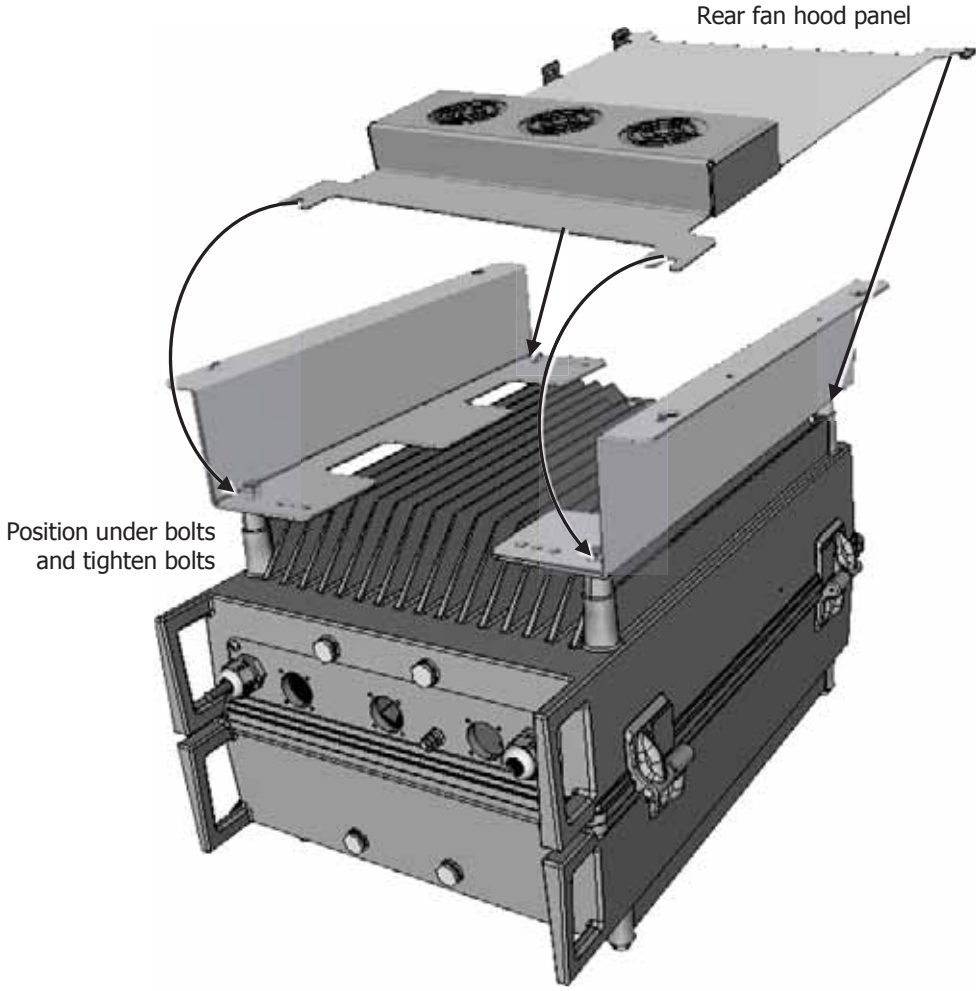


Figure 5-9. Assembling Rear Fan Hood Panel

Figure 5-10 illustrates the assembled brackets and rear fan-hood panel.

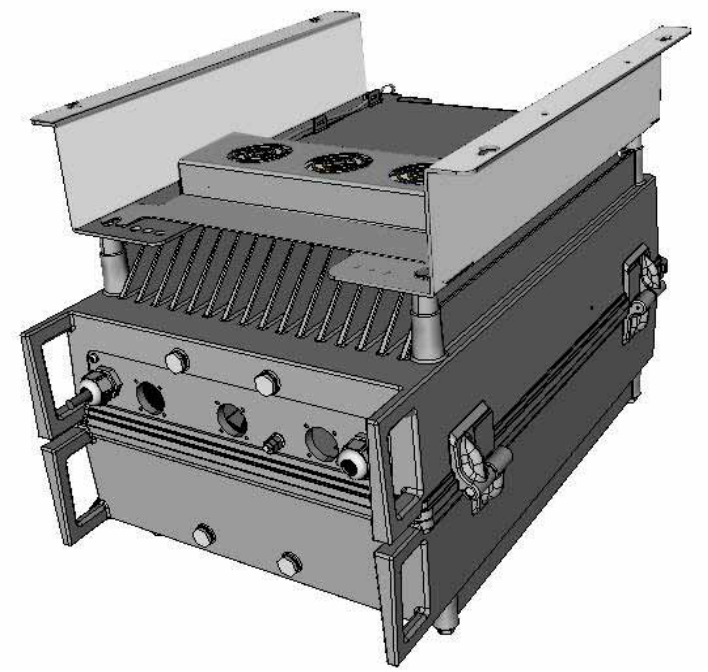


Figure 5-10. Assembled Rear Fan Hood and Mounting Brackets

4. Mount the repeater according to relevant section:
   Rack mount – Section 5.5;
   Wall mount – Section 5.5.2;
5. Assemble front fan-hood panel:
   - Referring to Figure 5-11, loosely insert the four M8x16 bolts and washers.
   - Hang the front fan hood on the repeater and tighten the bolts.

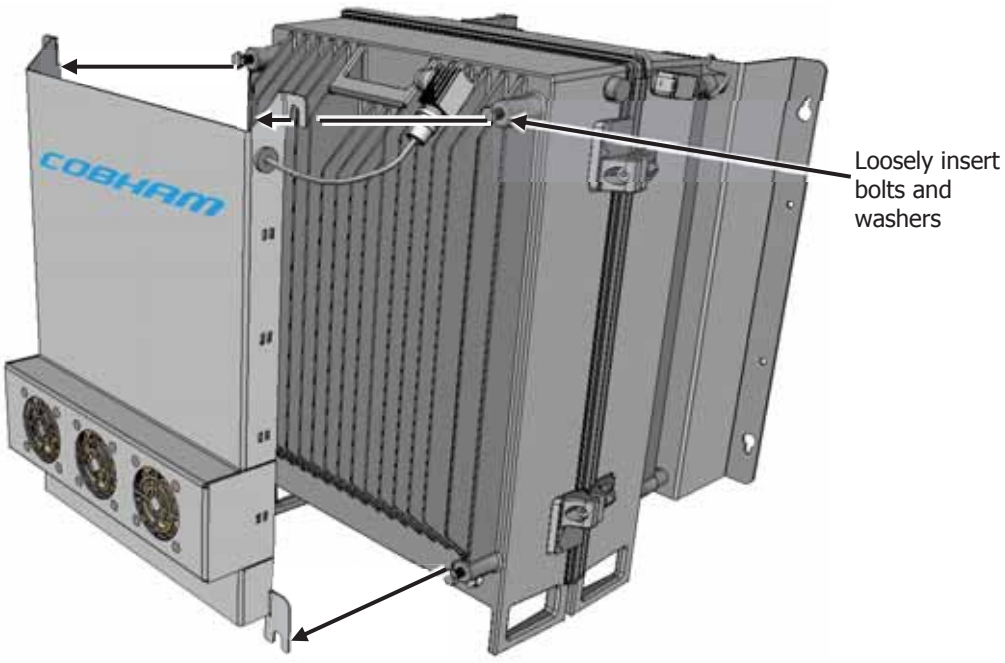


Figure 5-11. Assembling Front Fan Hood — Inserting Bolts and Hanging Front Fan Hood

6. Connect the fan hood power connections — connect the front fan hood and the rear fan hood power connectors to the repeater power connectors.

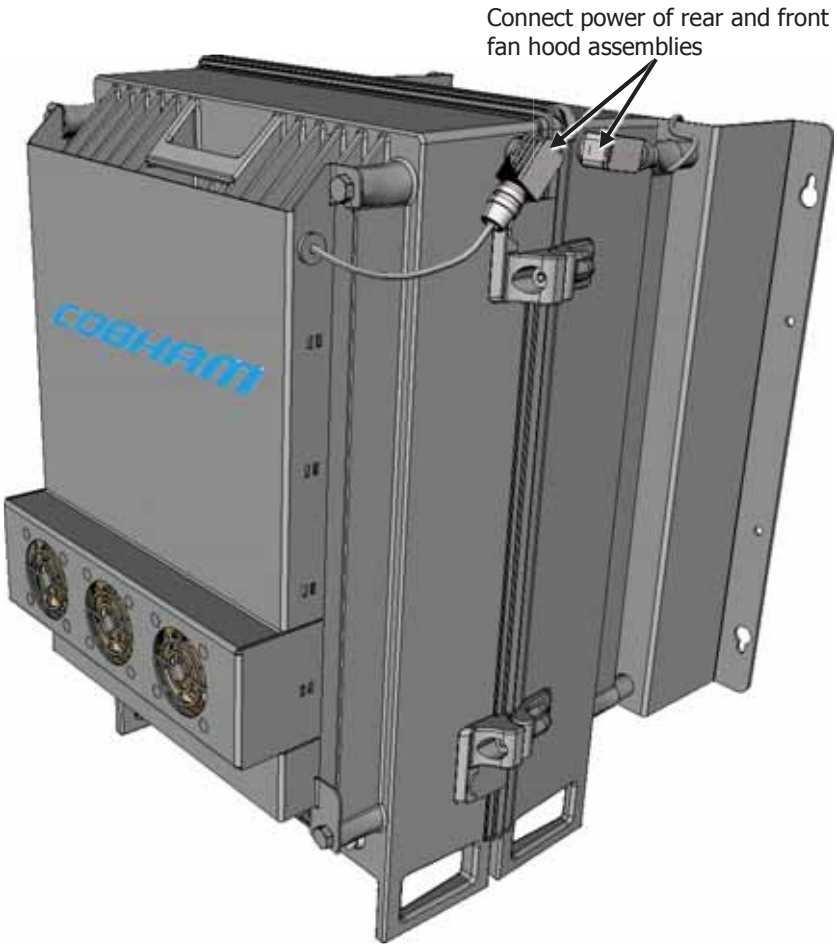


Figure 5-12. Fan Hood Power Connections

5.5 Mounting the Repeaters

This section describes how to mount the repeaters in a rack and on a wall.

⚠ IMPORTANT!

- The weight of the unit requires that two people mount the unit onto the rack.
- The repeaters must always be installed vertically with the connectors on the underside for protection. *Horizontal installation on a bench for long time may cause damage to the signal booster due to over-heating.*

5.5.1 Rack Mount Procedure

To mount the repeaters in a rack

Below are two views of a rack installation that includes the following elements:

- A remote without a fan hood;
- A remote with a fan hood
- A combiner filter (required for some installations)

NOTE: The Filter/Combiner is installed with the components *facing inwards.*

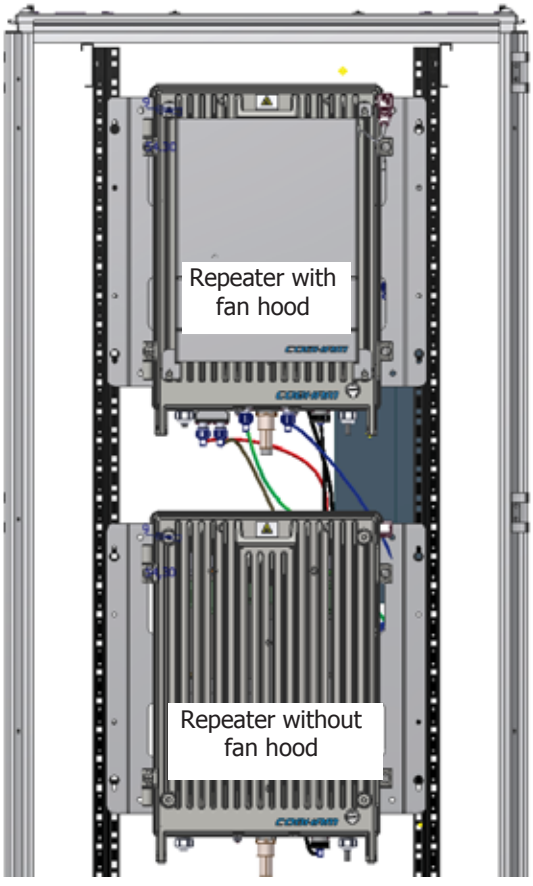


Figure 5-13. View-a of Rack Installation

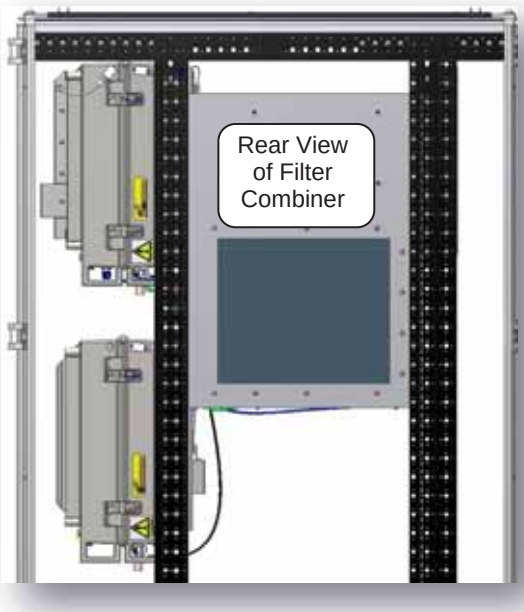


Figure 5-14. View-b of (same) Rack Installation

5.5.2 Wall Mount Procedure

⚠ WARNINGS!

- The repeater mounting procedure is for concrete or brick walls only.
- The weight of the unit requires that two people mount the unit on the wall.
- Due to the weight of the Repeater, it is NOT recommended to fix to a hollow wall.
- Always check that there are no pipes or cables hidden in the wall beneath the area to be drilled. Various pipe and cable detectors are available for this type of inspection.

⚠ AVERTISSEMENTS!

- *La procédure de montage du répéteur est seulement pour béton ou des murs de briques.*
- *Le poids de l'unité exige que deux personnes monter l' appareil sur le mur.*
- *En raison du poids du répéteur, il est recommandé de ne pas fixer à un mur creux).*
- *Toujours vérifier qu'il n'y a pas de tuyaux ou câbles cachés dans le mur sous la zone à percer. Différents détecteurs de tuyaux et de câbles sont disponibles pour ce type d' inspection.*

5.5.2.1 Marking the Wall and Drilling

- The Repeater wall mount brackets assembly should be fixed to a solid wall (these include brickwork, block work, and concrete).
- To provide secure fixing to a solid wall, the most common method is drilling and plugging.
- Use the X4 BOLT ANCHOR JUMBO 3/8" ZINC PLATED that are provided with the packing kit or parallel.
- Care must be taken to ensure the alignment of the four fixings. A spirit level or plumb line should be used to ensure horizontal/vertical alignment.

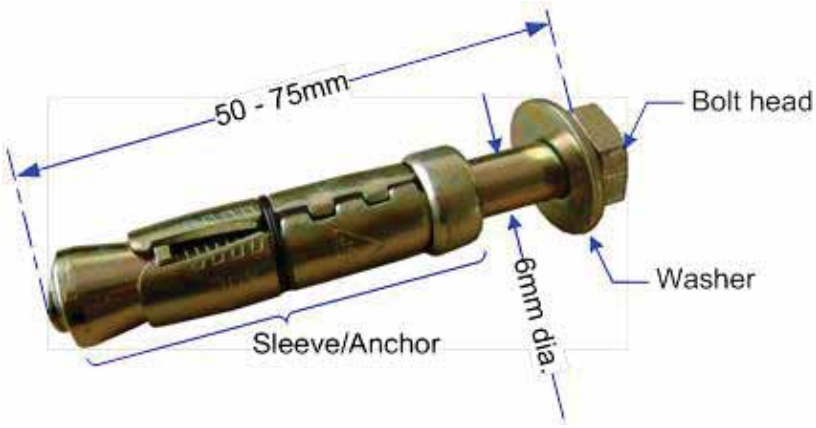


Figure 5-15. M6 Rawlbolt – recommended for wall mount.

To mark and drill the wall

1. Plan the location on the wall of the repeaters and any other required equipment (such as the 7-band filer/plexer for Australia if installed on the wall).
2. Using the provided template in the kit, mark out the fixing centers of the repeater and other equipment on the chosen wall.

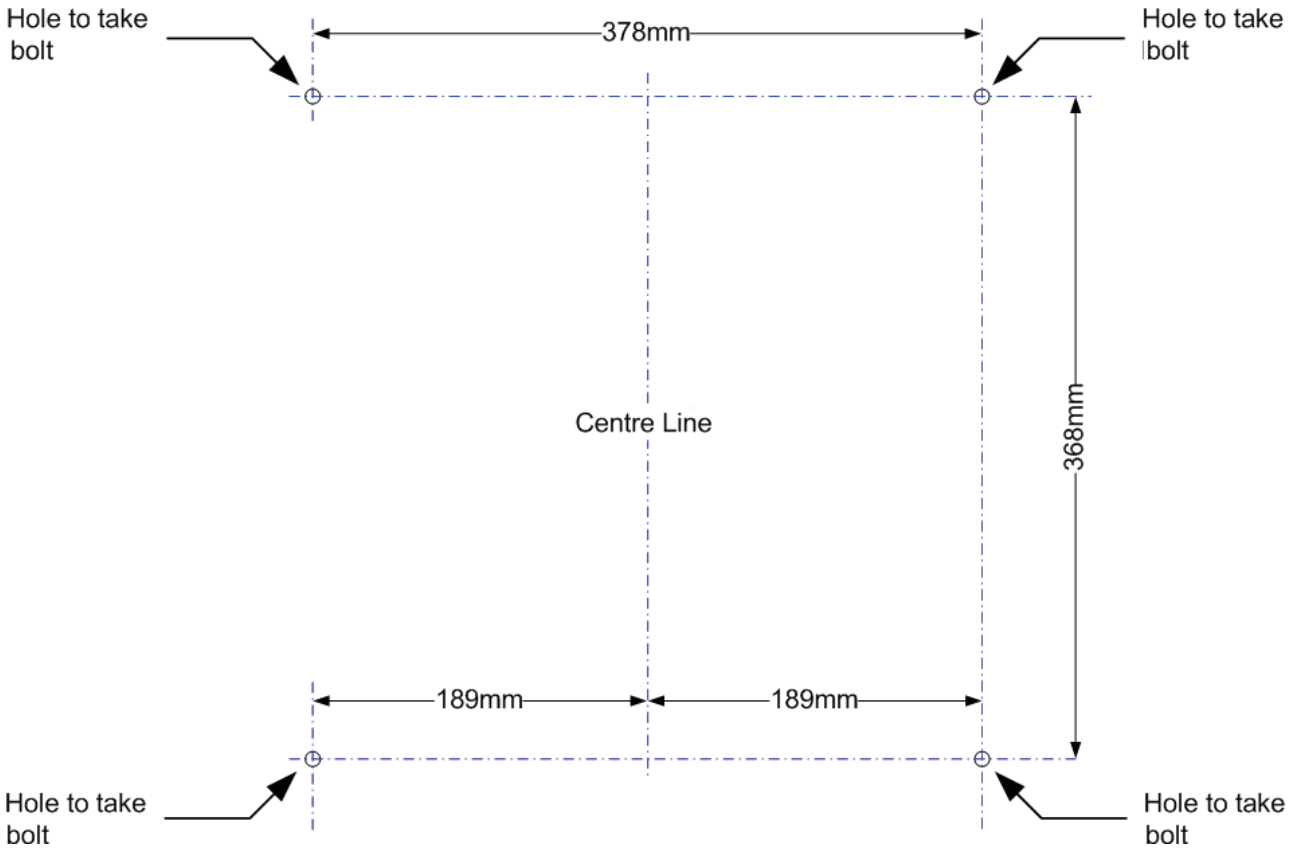


Figure 5-16. Template Example

3. Mark and drill the wall with the correct size masonry bit as specified by the fixing manufacturer.

NOTE: It is good practice to wear goggles to protect your eyes from flying debris when using power tools.

4. Hold the drill bit against the mark and begin drilling slowly so that the bit does not wander from the position. The wall should be drilled to a depth which is sufficient to accommodate the full length of the fixing.
5. Insert the fixings so that the top of the sleeve/anchor section is level with the wall surface.

6. Gently tighten the bolt by hand so that the anchor section of the fixing expands and grips the inside of the hole.

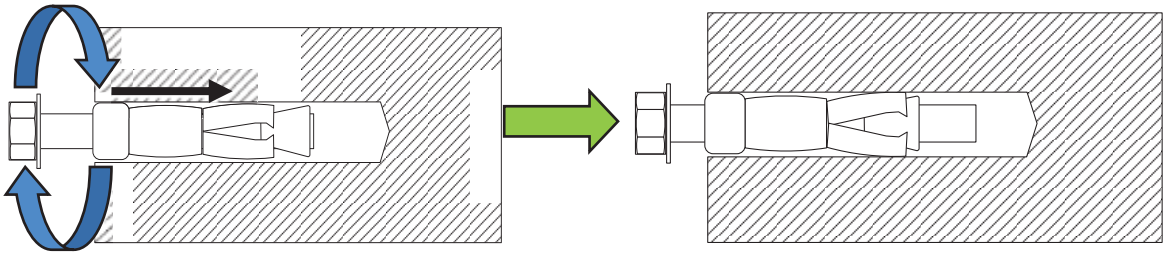


Figure 5-17: Inserting Fixing and Tightening.

7. As the bolt pulls its way in, the sides of the anchor section are forced outwards, gripping the surrounding surface.

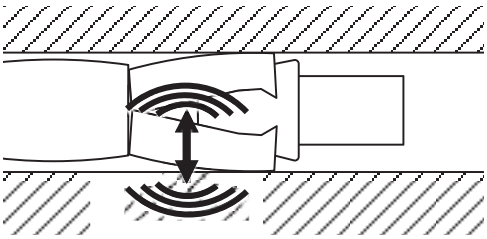


Figure 5-18: Anchor Sides Pushed Outwards.

8. Once all four fixings are in place, carefully withdraw the four bolts.

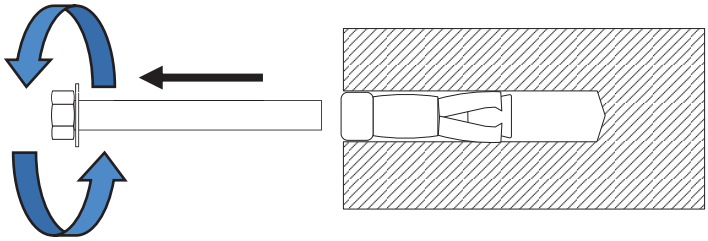


Figure 5-19: Withdraw Bolts

5.5.2.2 Mount the Repeater

⚠ CAUTION! It is recommended that two people lift the repeater since (depending upon the configuration) the idRU weighs between 20 and 38 kg (44 and 84 lb).
⚠ PRUDENCE! *Il est recommandé que le répéteur est soulevé par deux personnes depuis (en fonction de la configuration), le idRU pèse entre 20 et 38 kg (44 et 84 lb).*

To mount the repeater

- Align repeater with the four fixings. Great care should be exercised here as the repeater is very heavy. (A suitably rated heavy duty scissor lift table/trolley may be suitable for this operation.)
- Once repeater is held in the chosen position, carefully insert the fixing bolts through the mounting lugs of the Repeater and into the sleeve/anchor sections of the fixing in the wall and tighten the bolts.
- ***The repeater needs to be mounted tightly to eliminate vibration.***

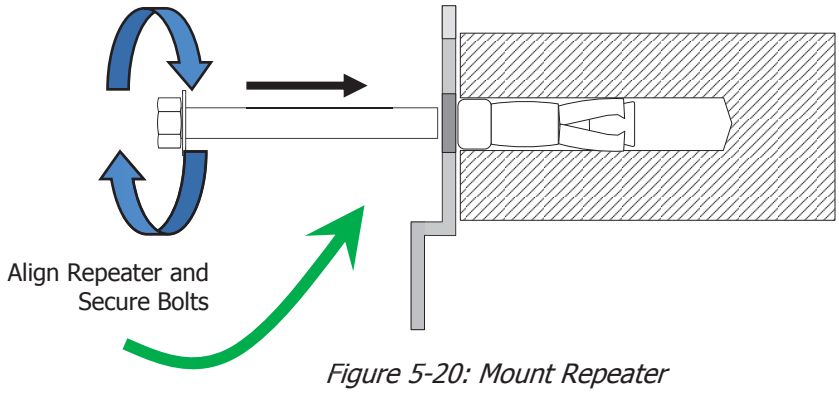


Figure 5-20: Mount Repeater

5.5.2.3 Recommended Additional Fixing

⚠ ATTENTION! It is the installer's responsibility to ensure the repeater is installed in a secure manner.
⚠ ATTENTION! *Il est de la responsabilité de l'installateur pour assurer le répéteur est installé de manière sécurisée.*

Suggested precautionary measure:

- A bracket is provided to securely mount the repeater on the wall; however, as an ADDITIONAL precautionary measure, it is recommended to further secure the repeater to the wall (in addition to the bracket).
- This can be done using any appropriate method.

The following figures provide EXAMPLES of additional fixings. In the examples, support is provided in the form of a CABLE HARNESS LOOP that is looped around the repeater handle and secured to the wall or part of the building support structure.

NOTE: The wallmount procedure illustrated below is relevant for all idRU-40 and idRU-30 models.

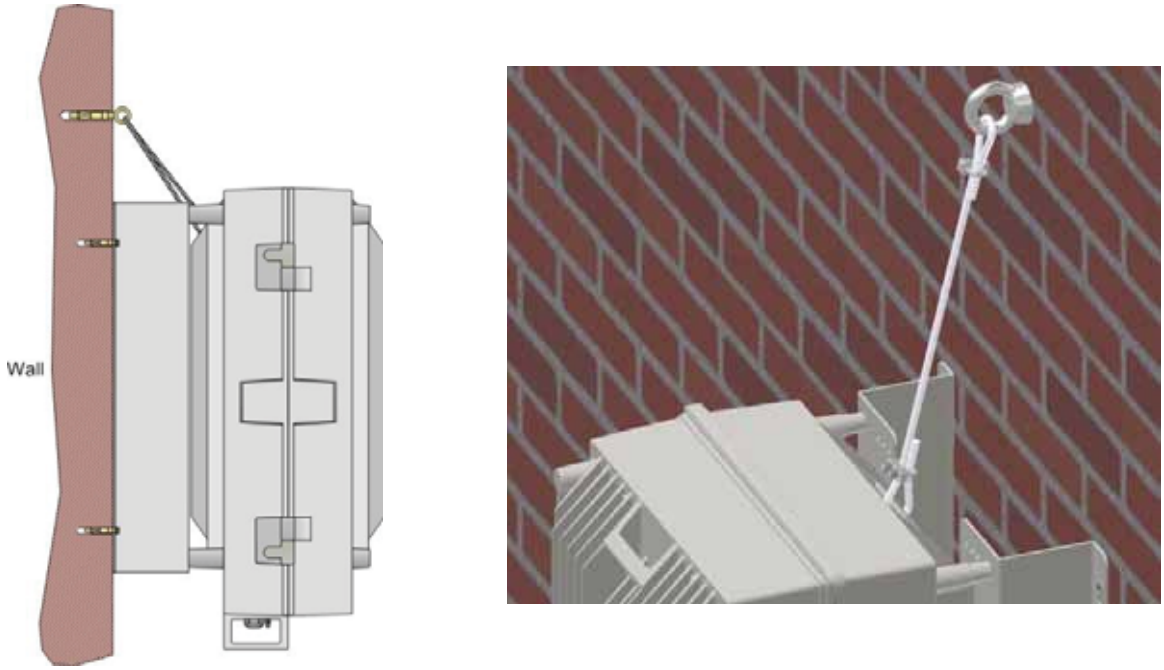


Figure 5-21: Example 1 – Additional Fixing to Wall

Another example is of a repeater installed on a stadium gantry. Again, the support can be in the form of a cable harness loop, using the handle of the repeater and part of the gantry structure.

⚠ ATTENTION! Any other secure method can be used.

⚠ ATTENTION! *Toute autre méthode sécurisée peut être utilisé.*

NOTE: The illustration shows an idRU-40. The procedure is identical for the idRU-30.

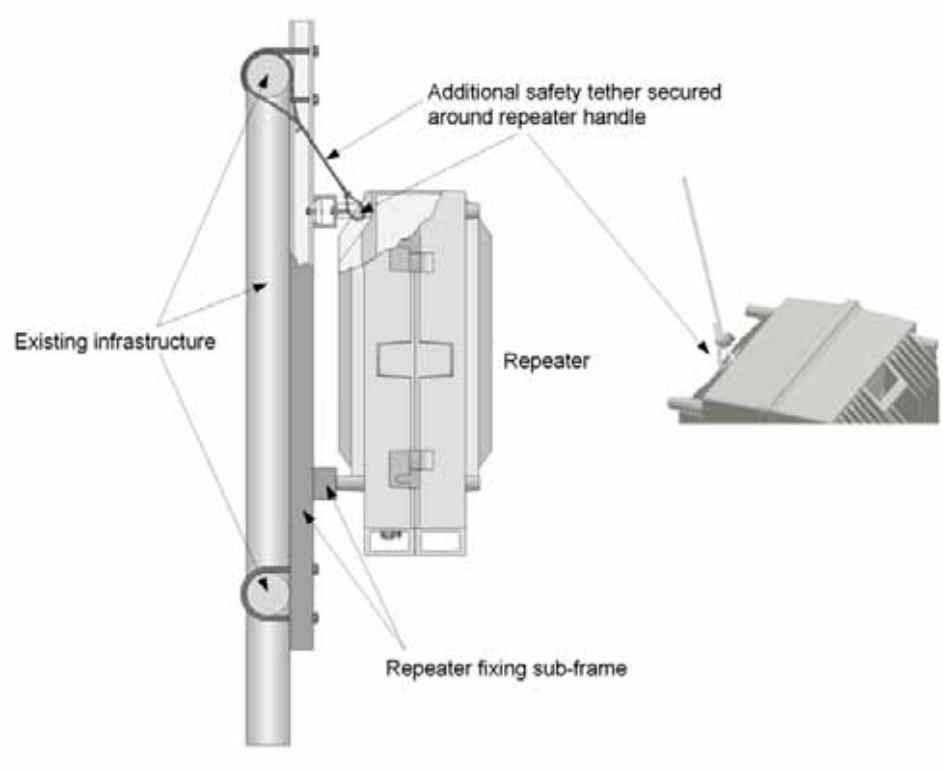


Figure 5-22: Example 2 – Additional Fixing to Gantry

5.6 idRU Connections

This section describes the following connections to single repeaters: GND, CPRI, External Alarms, Antenna and Power.

NOTE: The idRU model used for reference provides a general indication for all other connections.

⚠ CAUTION! If insufficient Electromagnetic Protection is provided, or if EMV measures are not taken, warranties issued by Cobham Wireless are not valid. Refer to section 3.8 for EMV Protection instructions.

⚠ PRUDENCE! *Si insuffisante protection électromagnétique est fourni, ou si des mesures ne sont pas prises EMV, les garanties émises par Cobham sans fil ne sont pas valides. Se reporter à la section 3.8 pour les instructions de protection EMV.*

NOTE: Use the one or two sets of provided threaded blank plugs (3732000831) and O-rings (3732000832) to plug any unused AUX ports or the Ethernet port.

5.6.1 Ground Connections

⚠ ATTENTION!

- The connection to GND is done by connecting to the earthing stud/screw in the enclosure and not through the power cable
- Ensure that good grounding protection measures are taken to create a reliable repeater site.
- Make sure to use adequately dimensioned grounding cables. The minimum recommended conductive area for a grounding cable is 16mm2
- Make sure the grounding product used is suitable for the kind and size of cable being used.
- Do not use the grounding bolt to connect external devices.
- For Dual Unit assemblies (five frequency band support), ground BOTH units.

⚠ ATTENTION!

- *La mise à la terre de l'unité se fait en se connectant à la mise à la terre stud / vis dans l'enceinte et non par le câble d'alimentation*
- *Veiller à ce que les bonnes mesures de protection de mise à la terre sont prises pour créer un site de répéteur fiable.*
- *Assurez-vous d'utiliser des câbles de mise à la terre suffisamment dimensionnés. La zone conductrice minimale recommandée pour un câble de mise à la terre est 16mm2*
- *Assurez-vous que le produit de mise à la terre utilisé est approprié pour le type et la taille du câble utilisé.*
- *Ne pas utiliser le boulon de mise à la terre pour connecter des périphériques externes.*
- *Pour les ensembles à deux unités (cinq fréquences de soutien de bande), rez-de-deux unités.*

To ground the repeater

Connect the grounding cable and lug to the ground M6 stud on the repeater front panel.

Minimum recommended conductive area for a grounding cable: 16mm^2

Figure 5-23. Grounding the idRU

5.6.2 SFP Installation and CPRI Connections

Follow this basic connection procedure for all topologies. Refer to Section 5.6.3, for connections of specific topologies such as cascaded 'string' installations, Master Slave, Redundancy, etc.

CAUTION! Un-terminated optical receptacles may emit laser radiation. Do not stare into beam or view with optical instruments.

PRUDENCE! *Récipients optiques qui ne sont pas terminées peuvent émettre un rayonnement laser. Ne pas regarder le faisceau ou voir avec des instruments optiques.*

ATTENTION!

Be sure to follow safety and connection procedures associated with optic fibres.

Assurez-vous de suivre les procédures de sécurité et de connexion associés à des fibres optiques.

ATTENTION!

In order to fully comply with NEMA-4 and with IP66 for ROW, all connected CPRI interfaces must be protected from moisture by using tubing and a seal that meet requirements equal to **REIKU PA RE B-23F** (seal) and **REIKU VP G R B-23M32** (tubing).

Afin de se conformer pleinement aux normes NEMA-4 et IP66 pour l'emprise, toutes les interfaces CPRI connectées doivent être protégées de l'humidité en utilisant un tube et un joint conformes aux exigences du **REIKU PA RE B-23F** (joint) et du **REIKU VP GR B- 23M32** (tube).

To connect the CPRI cable from to the repeater CPRI port

1. Unscrew the protective cylinder on the CPRI port(s) and set the cylinder and the accompanying sponge aside.
2. If not inserted, insert the SFP module in the CPRI port.

Figure 5-24. Remove Cylinder

3. Route the optic fibre through the cylinder and press into the rubber seal.

Figure 5-25. Press Fiber in Rubber Seal

4. Connect the CPRI connector to the repeater MAIN or AUX1 CPRI port according to your topology.
5. Screw the protective cylinder back around the CPRI port and fit the rubber inside to minimize the entry of any dirt, dust or dampness.

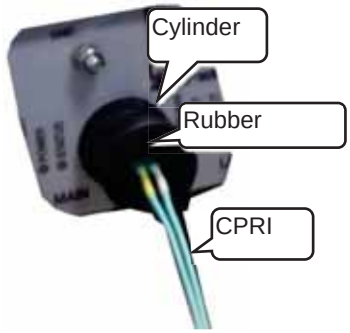


Figure 5-26. Fibre Connection

5.6.3 Topology Specific CPRI Connections

This section describes how to connect the CPRI cables for the following topologies:

- A string of cascaded idRUs
- Master Slave topology
- RF source redundant topologies

5.6.3.1 Cascaded idRU Connections

The cascaded idRU connections are relevant to all topologies that include 'strings' of idRUs.

To cascade idRUs

1. Connect an optic fibre cable between the **AUX1** port of the FIRST repeater to the **MAIN** port of the next repeater.
2. Continue interconnecting **AUX** ports to **Main** ports of each subsequent repeater.

NOTE: The AUX1 connection of the last idRU differs according to the topology.

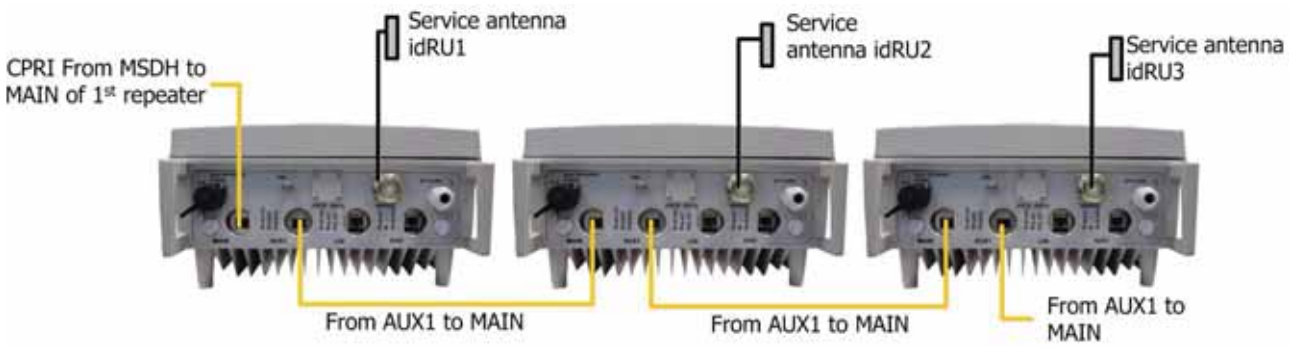


Figure 5-27. Example of Cascaded Repeaters Connections

5.6.3.2 Master Slave Topology idRU Connections

Refer to Section 2.3 for a general description of the Master Slave topology, and to Section 4.4.5.1 for detailed information on the Master Slave element connections and illustrations.

For a Master Slave installation connect the idRUs as follows

1. Referring to the site plan, connect the **MAIN CPRI** port of each first **idRU** in the string or single idRU to a **CPRI** port on either the **Master** or the **Slave MSDH**
2. For cascaded idRUs – interconnect **AUX1 CPRI** of one idRU to **MAIN CPRI** of next idRU as illustrated in the following figure.
3. Do NOT connect the **AUX1** port of the last idRU.
4. Plug the unused AUX1 port of the last idRU using the items described in Section 5.6.5.

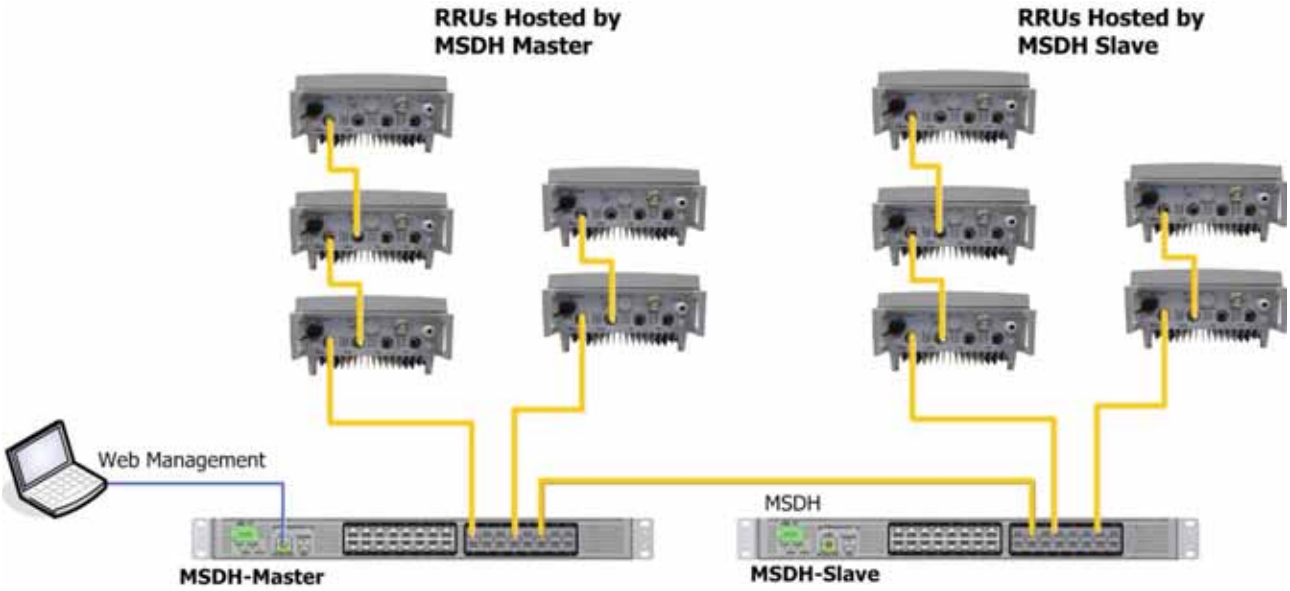


Figure 5-28. Example of Cascaded Repeaters Connections

5.6.3.3 Dual RF Source Redundancy idRU Connections

Refer to Section 2.4.1 for a general description of the Master Slave topology, and to Section 4.4.5.2 for detailed information on the Master Slave element connections and illustrations.

For a dual RF source redundancy connect as follows

1. Connect the **MAIN CPRI** port of the **FIRST idRU** to the **Primary MSDH**.
2. Cascade each of the remaining idRUs — interconnect **AUX1 CPRI** to **MAIN CPRI** of next idRU.
3. Connect the **AUX1 CPRI** port of the **LAST idRU** to the **Secondary MSDH**.

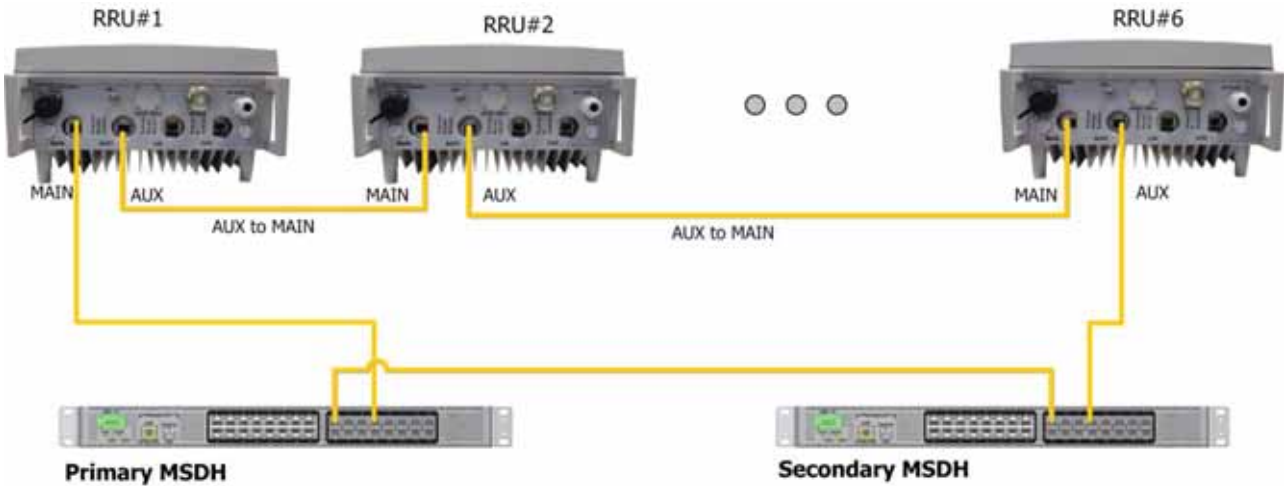


Figure 5-29. Example of Dual BTS Redundancy Connections

5.6.3.4 Dual-System Redundancy idRU Connections

No special idRU connections are required for dual-system redundancy driven topologies. Each system is connected according to the standard procedures.

5.6.4 Antenna Connections

⚠ **DC Blocks Required**	In some installations, under certain site conditions, it is required to add DC Blocks to the antenna cables of the remote units. For example, in installation locations with power cables that can induce currents resulting in trackside voltages or loop currents. In these types of situations, DC Blocks are required to protect the idDAS remotes from damage.
⚠ ***Blocs DC Requis***	*Dans certaines installations, dans certaines conditions de site, il est nécessaire d'ajouter des blocs DC aux câbles d'antenne des répéteurs. Par exemple, dans les emplacements d'installation avec des câbles d'alimentation qui peuvent induire des courants entraînant des tensions de voie ou des courants de boucle. Dans ce type de situations, les blocs DC sont nécessaires pour protéger les répéteurs idDAS contre les dommages.*

NOTE: More than one antenna port may be available depending on your repeater model.

Connect the service antennas to the SERVICE/MOBILE port.

- idRU-30 DIN 7/16" connector, female
- idRU-40 4.3-10 connector

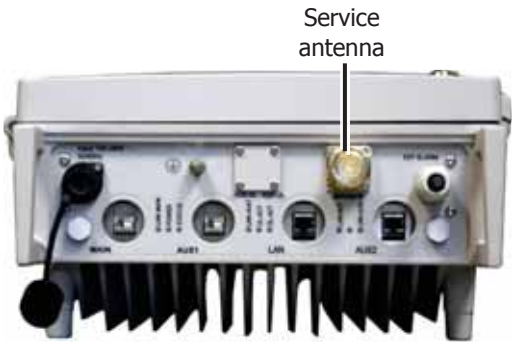


Figure 5-30. Front Panel Example showing Antenna Connection Port

5.6.5 Plugging Unused Ethernet and AUX ports

Use the one or two sets of provided threaded blank plugs (3732000831) and O-rings (3732000832) to plug any unused AUX ports or the Ethernet port.

5.6.6 Power Connection

NOTE: Refer to Section 3.7 for a full description of power requirements.

⚠ CAUTIONS!

- Use only the power cables (AC or DC) and any other relevant accessories provided with the unit to connect power to the idRU.
- Be sure to disconnect all power sources before servicing.
- Be sure the equipment is grounded before powering it on.
- Make sure the antenna cables or 50 ohm terminations are connected to the repeater's antenna connectors before the repeater is turned on.
- Please be aware that the equipment may, during certain conditions become very warm and can cause minor injuries if handled without any protection, such as gloves.

⚠ PRECAUTIONS !

- *Utilisez uniquement les câbles d'alimentation (AC ou DC) et tous les autres accessoires pertinents fournis avec l'appareil pour connecter l'alimentation à l'idRU.*
- *Veillez à débrancher toutes les sources d'alimentation avant l'entretien.*
- *Assurez-vous que le câble de mise à la terre de l'équipement soit raccordé avant la mise sous tension.*
- *Avant que le répéteur est activé, assurez-vous que les câbles d'antenne ou 50 ohms terminaisons sont connectés aux connecteurs d'antenne du répéteur .*
- *S'il vous plaît être conscient que l'équipement peut , dans certaines conditions devenir très chaud et peut causer des blessures mineures en cas de manipulation sans protection, comme des gants .*

To connect power

- **To connect AC power -** use one of the supplied power cords according to the requirements of your geographical location.
- **To connect DC power** - use the provided DC cable or a DC cable meeting the specifications described in section 3.7.6 according to the requirements of your geographical location.

Figure 5-31. Front Panel Example Showing Location of Power Connector

5.7 External Alarms and Relay Connections

This section describes two types of dry-contact connections:

- Standard idRUs
- idRU PS NFPA model

5.7.1 Standard idRUs External Alarm and Relay Connections

The standard idDAS repeaters support up to four active high or active low external alarms and one relay. The external alarms can be used to monitor third party equipment such as air-conditioners or power supplies that are located in the communication room.

NOTE: If the repeater includes a fan-hood assembly, one of external alarms is reserved (factory connected) for monitoring the fan-hood assembly.

The external alarms are connected to a plinth located inside the repeater. This requires routing the cable via the **Ext Alarms** aperture on the front panel, opening the repeater door and accessing the plinth inside the repeater.

In order to activate the external alarms, the alarms are configured in the web management GUI according to their operation mode: active high or active low. This is done as part of the setup procedure described in the **idDAS Commissioning Guide**.

5.7.1.1 Alarm Specifications

The wiring and connection specifications are as follows

- Required wire diameter 6-12 mm
- The maximum allowed load is 100mA.
- Alarms voltage: 15 to 60 Vdc (15 Vdc internal source is available)
- Each external alarm can be connected as active high or active low.

5.7.1.2 Connecting Alarms

To connect the dry-contact alarms

1. Open the repeater door using the provided key – Figure 5-2 and Figure 5-3.
2. Route your alarms cable (not provided) to the inside of the repeater, via the **Ext Alarms** aperture located on the front panel – Figure 5-32.
3. Inside the repeater, route the cable and wiring towards the alarms connector – Figure 5-33.

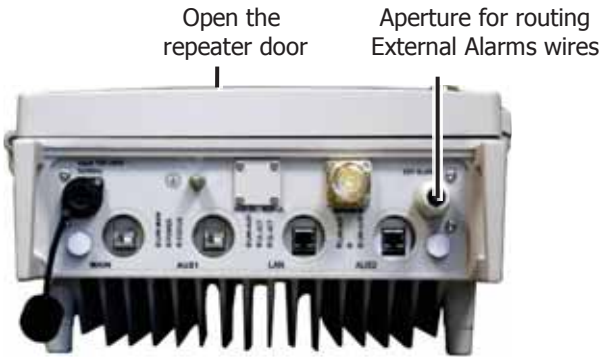


Figure 5-32. Front Panel Example Showing Location of Power Connector

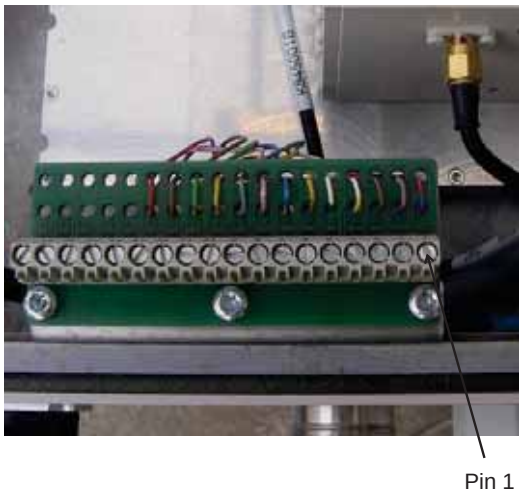


Figure 5-33: Dry Contact Alarms Internal Connector

4. Wire the alarms to the connector according to Figure 5-34. The figure provides an example of two active low alarms connections.

   Note the following:

   - For idRU-30, four alarms are available for connection.
   - For idRU-40 models with fan-hood, Ext-4 (Pin-7 and Pin-8), is factory connected as a fan-hood alarm. **Do not modify any factory connections.**
   - Verify that each connected alarm is grounded to the same ground as the idRU chassis ground.
   - Pins A and B (voltage and ground connections) for each alarm can be reversed: i.e. GND can be connected to either Pin-A or Pin-B.

- Pin-9 and Pin-10 can be respectively used as an internal 15 Vdc power source and as a chassis ground source.
- Each connected alarm must be configured via the idDAS web management according to its trigger: Active High or Active Low (Section 5.7.1.3). This step is also described as part of the commissioning procedures in the idDAS Commissioning Guide.
- It takes about 10 sec to activate an alarm.

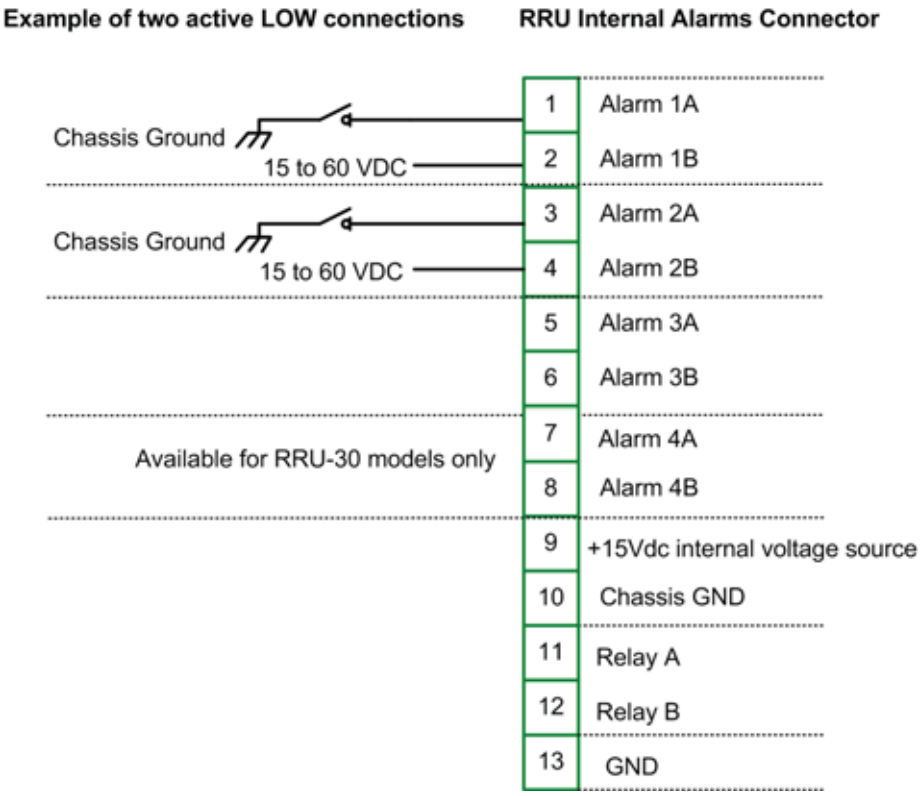


Figure 5-34: Dry Contact Alarms Pinout and Connection Example

5.7.1.3 Configuring idRU External Alarms

It is required to configure any external alarms connected to the idRU according to the trigger (high or low) and it is recommended to assign the alarms recognizable names (such as High Temperature, etc.). This is done via the web management GUI.

The procedure is described in the **idDAS Commissioning Guide** as part of the setup, and provided in this section for your convenience.

NOTE: For idRUs with fan-hood, three alarms are supported, where the fourth alarm is reserved for fan-hood monitoring and must not be modified.

To configure the external alarms

1. Open a session to the idDAS web GUI and log into the idRU whose alarms are to be configured.
2. In the hover-menu of the relevant idRU, click on the **External Alarms** option.
3. For each alarm:
   - Set the **Trigger** to High or Low according to the connection.
   - Assign the alarm a recognizable description
4. Click **Apply**.

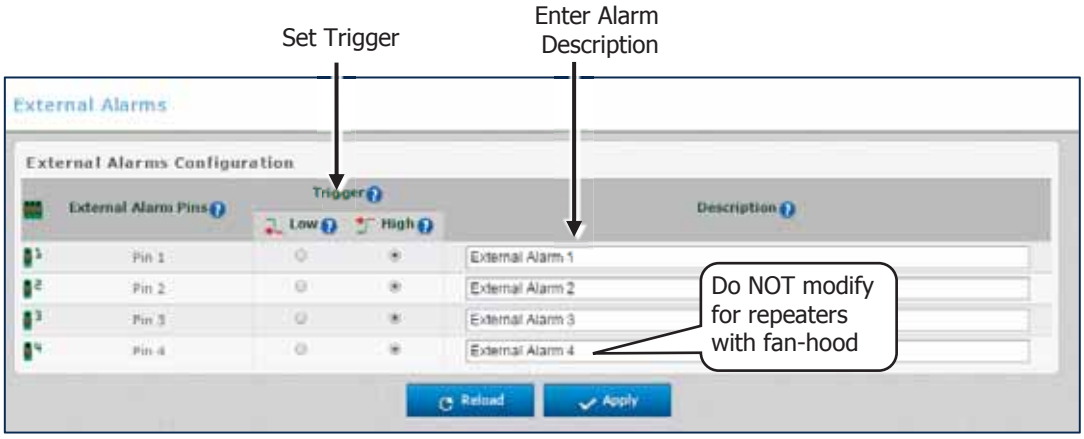


Figure 5-35. Configuring idRU External Alarms

5.7.2 idRU Public Safety External Alarms and Relay Connections

The dry-contacts alarms pin-out and interface have been modified for idRU public safety repeater models for NFPA compliance. The public safety compliant idRUs support the following dry-contact alarms:

- Two external alarms – Ext Alarm 1 and Ext Alarm 2. These are configured via the External Alarms hover-menu option.
- Antenna Disconnect alarm – provides indication of the antenna connection status. This alarm does not required configuration.
- General alarm – provides indication if any idRU alarms are triggered. The associated alarms can be filtered.

5.7.2.1 idRU Alarms Connections and Pin-out

The idRU public safety alarms interface is implemented via an external, binder-type circular connector. The mating cable assembly is provided in the accessories kit of each remote.

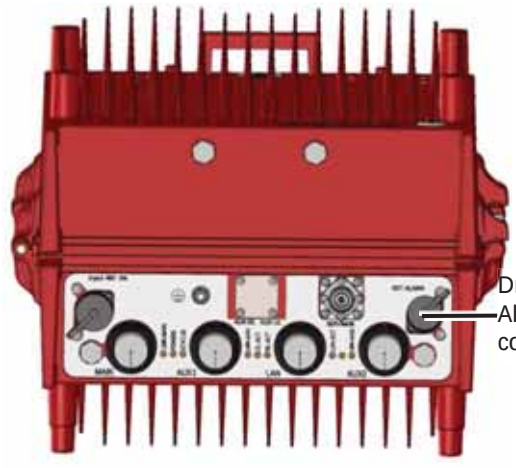


Figure 5-36. idDAS PS NFPA RRU Front Panel

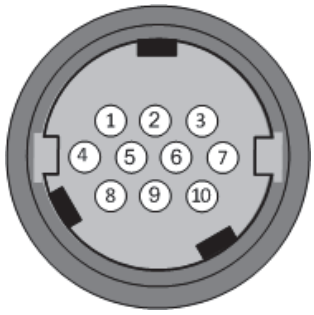


Figure 5-37. Alarms 10 Pin Circular Connector

Table 5-1. RRU Dry-contact Alarms Connector

PIN#	SIGNAL NAME	WIRE COLOR
1	Ant Disconnect Normally Open	Orange
2	Ant Disconnect Normally Closed	Blue
3	Ant Disconnect Common	Green
4	General N.O.	Red
5	General Alarm Normally Closed	Brown
6	External alarm 1 (A)*	White
7	External alarm 1 (B)*	Yellow
8	General Alarm Common	Black
9	External alarm 2 (A)*	Grey
10	External alarm 2 (B)*	Purple

*If connected, it is required to configure External Alarms 1 and 2 via the web management application as described in Section 5.7.2.2. The General and Antenna Disconnect alarms do not require configuration.

5.7.2.2 Configuring the idRU External Alarms 1,2

The idRU PS NFPA External Alarms 1/2 are configured via the web management application. This is done as part of the commissioning procedure detailed in the **idDAS Web Management Guide** or at any other time. For convenience and quick reference, a brief description is provided below.

To configure the idRU External Alarm 1 and External alarm 2

1. Log into the relevant idRU and click the **External Alarms** hover-menu option.
2. If relevant, configure the **External Alarms 1** and **External Alarms 2** as follows:
   - Set the **Trigger** to High or Low as required.
   - You may optionally assign the alarm a recognizable description.
   - Click **Apply**.

NOTE: Do NOT modify the definitions for External Alarm 3 (General alarm) and for External Alarm 4 (fan-hood). These alarms do NOT require configuration.

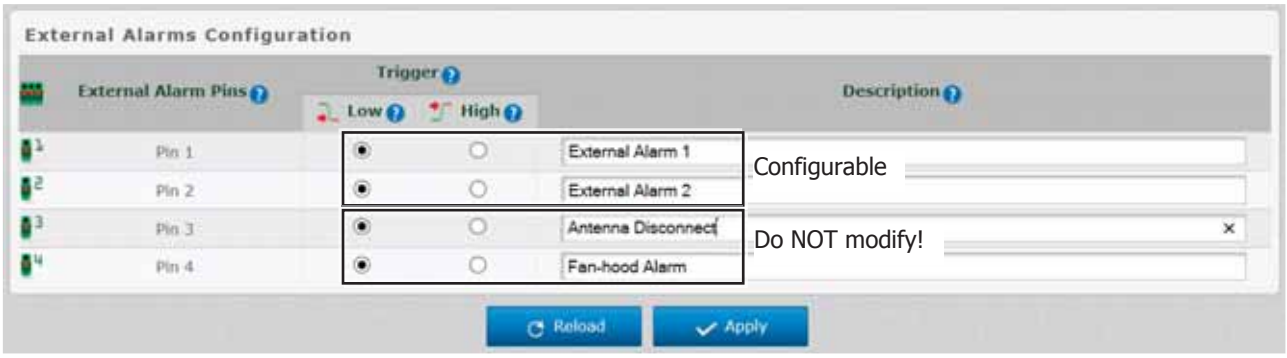


Figure 5-38. Configuring idRU External Alarms

5.7.2.3 idRU General Alarm Filtering

The relayed alarm for a specific idRU can be filtered via the **idRU Alarms Configuration** hover-menu of that idRU. User selected alarms can be disabled for routing *globally* for all idRUs via the **MSDH Alarm Configuration** hover-menu or for a specific idRU via the **idRU's Alarm Configuration** hover-menu (Section 4.4.4.2).

To filter out idRU alarms affecting the relay

1. Log into the relevant idRU and select the **Alarms Configuration** hover-menu option.
2. Select the MSDH **Alarms Configuration** hover-menu option.
3. Click the **Advanced** button.
4. Under **Dry Contact**, uncheck the required alarms to disengage them from the relay.
5. Click **Apply**.

Figure 5-39. Filtering Alarms Associated with the Relay

5.7.2.4 Monitoring the Alarms

All of the idRU dry-contact alarms are monitored via the General area in the idRU Home window, General area:

- General Alarm – via the General LED
- External Alarm 1/2 – the LEDs of the relevant alarms
- Antenna disconnect – monitored via the LED of External Alarm 3.
- Fan-hood – LED of External Alarm 4

Figure 5-40. RRU Home Screen Antenna Disconnect Status

6 Verification And Maintenance

This chapter provides the following information

- Installation verification
- Required Tools
- Maintenance schedule
- Routine inspections of the system
- Periodical administrative and monitoring procedures
- Replacement procedures
- F/O Cleaning Procedure

6.1 Basic Verification of the Installation

After completing the physical connections, it is recommended to perform some basic verification procedures and tests on the idDAS elements according to the list of procedures in the following table.

Once the installation has been verified, continue to the commissioning procedure as described in the **Commissioning Guide**.

NOTE: If any of the requirements are not compliant, please contact your Cobham Wireless project manager team.

PROCEDURE	VERIFY THE FOLLOWING:

LEDs on element front panels	Inspect and verify the LEDs on the front panel of the elements are green, indicating normal operation:
	APOI
	• BTSI LEDs - DL Input and DL Output LEDs = steady green
	• Control Module CCD status LED = blinking green
	MTDI
	• L1 MM SFP = red flash every 10sec – SFP self-test OK
	• L2 SM SFP = fast blinking green – link connected; slow blinking green – no link
	• ST LED – Very slow blinking green indicates system self-test OK
	MSDH
	• System LEDs:
	  • Power and Master – steady green
	  • Identify and Status – off
	  • All LEDs flash every ~12sec. When the *Identify* function is activated in the GUI, all LEDs blink quickly on identified unit.
	• CPRI with SFPs – all SFP LEDs flash every few seconds. One of the four LEDs indicates link status as follows:
	  • Steady green – link identified and operational
	  • Slow blinking green – searching for link
	NOTE: idRU LEDs currently not applicable.

Continued on the next page….

PROCEDURE	VERIFY THE FOLLOWING:
Installation status	• Verify all fibre links end-to-end are installed and connected. • Verify the DAS is installed and connected to each idRU antenna port as per design. • Verify that all equipment, including racks and idRUs, are installed and powered. • Verify that all BTS systems are installed and activated. • Verify that all DAS between the BTS and top of the Rack installed and connected. • Verify there are no active alarms on the MSDH. • Verify that all elements are installed with the same software version. This is done as part of the commissioning procedure via the **Inventory** hover-menu option.
Tests performed on Installation	• Verify the following RF tests have been performed on the DAS: VSWR Test, PIM Test, DAS Coverage test using CW signal • Verify that all losses between BTS elements and top-of-the-rack are as expected according to the calculated link budget. • Verify all fibre links are tested end-to-end as per Cobham Wireless fibre guidelines (including all patch leads).

6.2 Required Tools

IT KIT	COMMENTS
Items required for parallel access to the system (including AEM if relevant) and access to the internet	
Required software: • Chrome browser • File transfer application (e.g. Winscp) • TeamViewer Client version 7	Do not use Explorer, and clear regularly with cache. TeamViewer is used when providing support.
Required Cables: • USB cable type A (Printer cable) • Ethernet cable	
TOOLS	**COMMENTS**
Master key for racks (e.g. Rittal keys)	
Keys for idRUs	
Screwdriver Torx T8, T10, and T20	
Screwdrivers Pozidrive 2, and 3	
Flat Screwdriver	
Adjustable wrench	
Adjustable 30mm spanner	
Spanner 8mm, 22mm, and 19mm	
QMA decoupling tool for high density application.	Example of supplier: HUBER+SUHNER, Type: 74_Z-0-0-459, Item: 84032400
Allen key M6 (for idRU bolts)	

RF TEST EQUIPMENT AND KIT	COMMENTS
Spectrum Analyzer	Capabilities: reads LTE control channel, channel power
Signal Generator	Up to 3Ghz @ 0dBm
Multimeter	
RF components: • RF cable N-type Male to N-type Male, 1.5meters Cables • 4.3-male to N-type female adapter • 30dB attenuator 50W, up to 3GHz, N-type Male to N-type Female • 50ohm loads, 50W, N-type Male	
FIBRE CLEANING AND TEST EQUIPMENT	**COMMENTS**
OTDR (Optical Time Domain Reflectometer)	
Optical power meter	
Fibre Scope	
Light Source	
LC fibre cleaner kit	
Spare SFP modules	Verify you have spares for all SFP types in your system.

6.3 Maintenance Schedule

UNIT	LRU/ SRU	MAINT. CATEG.	PREVENTIVE MAINTENANCE TASK	FREQUENCY	SKILL LEVEL	REFERENCE
MSDH-M	LRU	FC	Backup the configuration to an external location.	Every configuration change	Admin user	Section 6.5.1
	LRU	FC	Verify optical levels.	Upon installation and initial commissioning. Every 6 months	Oper user	Section 6.5.2
MSDH	LRU	RP	Replace fan unit.	Every 6 years	Mechanical	Section 6.6.3
MTDI	LRU	RP	Replace fan unit.	Every 6 years	Mechanical	Section 6.6.3
idRU 40	LRU	RP	Replace fan unit.	Every 4 years	Basic	Section 6.7.1
APOI	LRU	-	None required	-	-	-

Terminology

COLUMN	DEFINITION
LRU/SRU	LRU – Line Replaceable Unit; SRU – Shop Replaceable Unit
Maintenance Category	IS (Inspection) CL (Cleaning) FC (Function Check) RP (Replacement) VC (Visual Check)

6.4 idDAS System Routine Inspections

For optimum performance of the idDAS system, perform the following inspections on every site visit, at least once a year or more often as required by site conditions. Remove any excessive dust accumulations using standard procedures and tools for this type of equipment.

NOTE: To avoid potential signal loss and performance degradation: If a fibre is disconnected be sure to clean the fibre connector and the SFP according to standard fibre-optic cleaning and verification procedures before reconnecting.

Routine inspections

1 Site inspection	• Inspect the installation site for moisture, loose wires or cables, and excessive dust. • Make sure that the power and grounding cables are arranged so that they do not obstruct access to other device components.
2 Ground and power connections	• Inspect the rack and elements power and ground connections.
3 Fibre and coax connections	• Inspect the fibre and coax connections.
4 Airflow around elements	• Make sure that airflow is unobstructed around the devices and into any openings in the enclosures.
5 Dust	• Make sure the fins of the remote units (idRUs) and the fan-hood do not have excessive dust deposits. • Make sure the fans of the MTDI and MSDH units do not have excessive dust deposits.
6 Power supply LEDs	• Routinely check the PWR LED on the power supplies front panel. If this LED is solid green, the power supplies are functioning normally.
7 Front panel LEDs	Check the status LEDs on the front panel of the elements and verify they are green. See section 6.1.

6.5 Periodical Procedures

As part of the routine maintenance of the idDAS system, the administrator should perform the following operations:

- With every configuration change, the current configuration should be backed up.
- The optic level signal of the system connections should be verified.

6.5.1 Configuration Backup

The administrator can back up the current configuration onto the MSDH Master or to another location. If needed, this backup file can then be used to restore the configuration. Two types of files can be individually backed up and restored:

- System backup – this file is the *crucial* file containing all the required information. It saves the system configuration for the specific installation and *specific elements* according to equipment ID.
- General Backup – this file contains the definitions of the Operators, quota definitions and frequency ranges.

To back-up the current configuration file

1. In the hover-menu, under **System Administration**, select the **Configuration Backup** option. The Configuration Backup dialog appears.

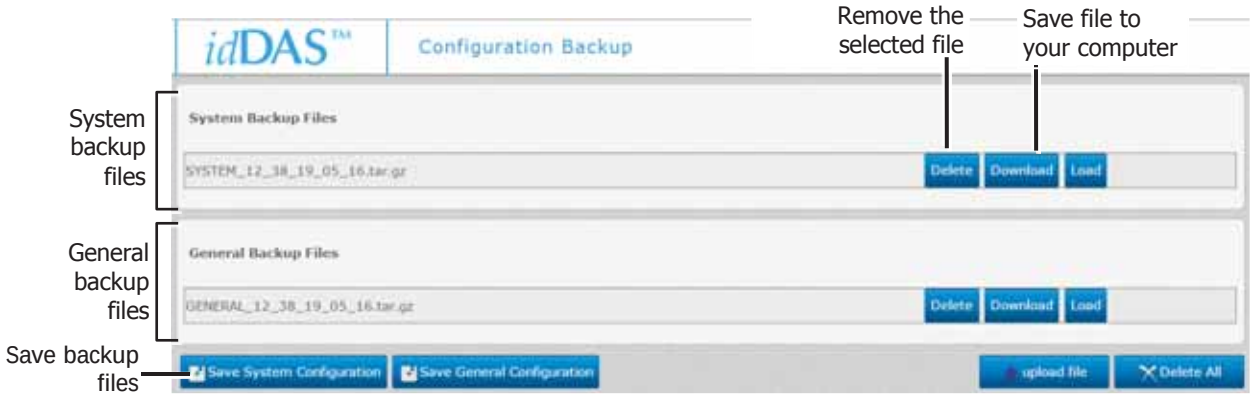


Figure 6-1. Configuration Backup Dialog

2. To back up the current configuration, click one or both of the following as needed:
   - **Save System Configuration** - system configuration according to equipment IDs
   - **Save General Configuration** - definitions of the Operators, quota definitions and frequency ranges

   The configuration file is immediately saved and labeled according to the time and date that it is saved. For example, the System file **SYSTEM_12_38_19_05_16.tar.gz**, is saved at 12:38 on 19-MAY-2016.

   The backup files will be listed in the relevant window areas (e.g. System Backup File for System files, and General Backup Files for General files).
3. To save a backed up System or General configuration file to your computer:
   - In the relevant window area (System Backup Files or General Backup Files), select the file to be saved (if more than one file is available for each type of configuration).
   - Click **Download.** The file will be saved in your computer's default Downloads directory.

6.5.2 Verifying MSDH Optical Levels

Periodically, every six months, it is recommended to verify the optical levels of the system. For reference of the desired optical levels, it is recommended to save or record the initial optical levels (after commissioning) for reference. Every six months, the values should be compared to verify there is no deterioration of the optical levels.

To verify the optical levels

1. Access the main monitoring screen of each MSDH:
   - For the Master MSDH (MSDH-M) – click the **Master MSDH** hover-menu option.
   - For the Slave MSDH (MSDH-S) – log into the relevant MSDH using the **Login** button. This can be done from various screens: for example, from the **Inventory** screen, select the MSDH and click **Login**.
2. Record the values or acquire a screen capture of the image and save to a specific location for reference.

Figure 6-2. MSDH Optic Levels (Partial Home Screen – Advanced Mode)

6.6 MSDH and MTDI Element Replacement Procedures

This section describes how to replace the following elements:

- MTDI RF module and MTDI chassis replacement
- MSDH replacement
- MTDI and MSDH fan module replacement

6.6.1 MTDI Elements Replacement

NOTE: Only the MTDI RF modules can be replaced. Any other fault such as a control module or a power supply error, or would require replacing the chassis.

This section provides the following information:

- MTDI RF module replacement
- MTDI unit replacement

6.6.1.1 MTDI RF Module Replacement

NOTE: The procedure for replacing an MTDI RF module requires the MTDI to be powered OFF and ON. The required steps have been designed to minimize down time.

To replace an MTDI RF module

1. Remove the RF module as follows:
   - Label the RF connections for that module so the cables can be reconnected quickly and correctly to the same ports.
   - Disconnect the RF connections to the suspect module.
   - Loosen the captive screws of the suspect module and pull the suspect module out.
   - Place the suspect module in the packaging of the replacement module.

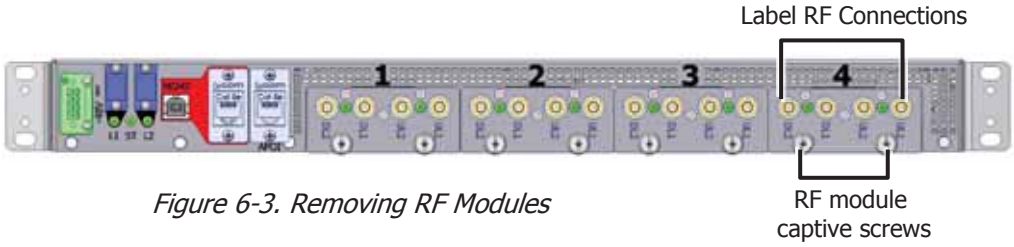


Figure 6-3. Removing RF Modules

2. Install the new module as follows:
   - Disconnect power MTDI unit.
   - Gently but firmly insert the new module in the appropriate slot and tighten the captive screws.
   - Connect the RF cables.
   - Power on the MTDI and verify that the RF module LEDs flash green every few seconds.
3. Verify the operation of the MTDI RF module in the idDAS web GUI as follows:
   - Log into the MTDI unit.
   - Verify the module is identified and is operating properly.

6.6.1.2 MTDI Unit Replacement

This section provides basic information on replacing the MTDI unit. If the new unit is of exactly the same model and configuration as the previous unit, the Clone option can be used to transfer the configuration from the suspect unit to the new unit after the physical installation. (The Clone option will be referred to in the instructions).

> ⚠ ATTENTION! Before reconnecting CPRI cables, be sure to clean the CPRI cable and SFP interfaces using standard fibre cleaning procedures. See Section 6.10.

To replace an MTDI unit

1. Unpack the replacement MTDI enclosure and set it aside on a flat clean surface.
2. Record the serial number of the suspect unit – located externally on the label at the side of the enclosure.
3. Disable the routing profile (Section 6.9.1).
   - Open an idDAS web GUI session.
   - Click the **Routing Profiles** hover-menu option and select the '**disabled**' routing profile option. This disables all routing profiles.
4. Label all the cables connected to the RF modules of the suspect MTDI so they can be reconnected correctly.
5. Uninstall the suspect MTDI as follows:
   - Disconnect power.
   - Label and disconnect the CPRI connecters.
   - Disconnect the RF connectors.
   - Disconnect the GND connector.
   - Dismount the suspect MTDI along with its brackets and place it on a flat surface.
6. Clean the external surface of the suspect MTDI of dust and pack it in the packaging of the new MTDI for transport.
7. Referring to the relevant section in Chapter 4, install the replacement MTDI:
   - Mount the new MTDI in the rack.
   - Ground the unit.
   - Clean the CPRI cables and the SFP connector and connect the CPRI cables.
   - Reconnect the RF cables according to the labels.
   - Connect power.
8. Verify the following LEDs flash as follows:
   - RF board LED – flash green every few seconds.
   - ST LED – slow blinking green (~3sec OFF and 3sec ON).

9. In the web GUI:
   - If the MTDI is replaced by a unit of the *same model*, this is automatically identified by the system and the configuration of the replaced unit can be transferred to the new equipment using the Clone option. Section 6.9.2.
   - Click on the **Inventory** hover-menu option and verify the unit four-digit **ID** is displayed. Section 6.9.3.
   - Click the **Routing Profiles** hover-menu option and re-enable the relevant routing profile. Section 6.9.1.

6.6.2 MSDH Unit Replacement

This section provides basic information on replacing the MSDH unit.

> ⚠ ATTENTION!
> - Before replacing the MSDH unit, it is required to back up the configuration to an external location.
> - Before reconnecting CPRI cables, be sure to clean the CPRI cable and SFP interfaces using standard fibre cleaning procedures. See Section 6.10.
> - In order to complete the MSDH replacement procedure, you will need to refer to the **idDAS Quick Commissioning** document in order to log into the new MSDH unit.

To replace an MSDH unit

1. Back up the system configuration to an external location according to Section 6.5.1.
2. Unpack the replacement MSDH and set it aside on a flat clean surface.
3. Record the serial number and the four-digit identification located on the suspect unit chassis –externally on the label at the side of the enclosure.
4. Label the following cables:
   - CPRI cables
   - Any connected Ethernet backhaul cables
5. Uninstall the suspect unit as follows:
   - Disconnect power.
   - Disconnect the LAN cable.
   - Disconnect the CPRI and any Backhaul cables.
   - Disconnect the GND connector.
   - Dismount the suspect MSDH along with its brackets and place it on a flat, clean surface.
6. Clean the external surface of the suspect MSDH of dust and place it in the packaging of the replacement MSDH for transport.
7. Referring to the relevant section in Chapter 4, install the replacement MSDH:
   - Mount the new MSDH in the rack.
   - Ground the unit.
   - Clean and connect the CPRI cables according to the labels.
   - Connect the Ethernet cables according to the labels.
   - Connect power.
8. Verify the LEDs are lit as follows:
   - Power and Master LEDs – steady green
   - All LEDs flash every 12sec.
9. Referring to either the **idDAS Quick Commissioning Guide** or **idDAS Web Management Guide**:

- Open a first time web session to the MSDH – MSDH factory set IP Address is **192.168.1.253**.
- From the **Ethernet** hover-menu screen, set the MSDH network parameters (Static IP address or DHCP).

10. Restore the previously backed up configuration according to Section 6.9.4.

6.6.3 MTDI/MSDH Fan Module Replacement

The same fan module and the same procedure are used for replacing the MSDH and the MTDI fan modules.

⚠ CAUTION! Be sure to disconnect power before disassembling the Fan Module.

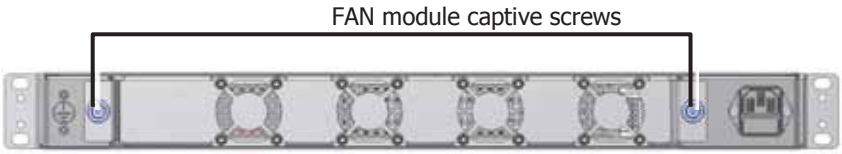


Figure 6-4. MTDI/MSDH Rear Panel Interfaces

To replace the MTDI/MSDH fan module

1. Disconnect power to the unit.
2. Open the Fan Module captive screws and pull the fan module out.
3. Insert the new Fan Module and tighten the captive screws.
4. Reconnect power to the unit.

6.7 idRU Replacement Procedures

This section describes how to replace the following elements:

- idRU 40 fan-hood module replacement
- idRU replacement

6.7.1 idRU-40 Fan-hood Module Replacement

NOTE: For optimal system operation, it is required to replace the fan-hood every four years.

The idRU 40 repeaters support two fan-hood modules: front fan-hood and rear fan-hood. The fan-hood replacement procedure requires disconnecting all the cables and dismounting the repeater.

⚠ CAUTION! It is recommended that two people lift the repeater since (depending upon the configuration) the idRU weighs between 20 and 38 kg (44 and 84 lb).

To replace the idRU fan-hood modules

1. Note the four-digit number on the label at the side of the suspect repeater. This information will be needed when verifying connection to the repeater after completing the replacement procedure.

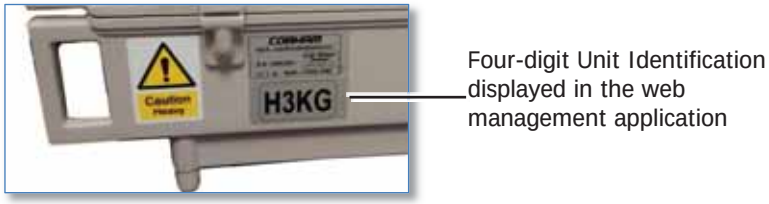


Figure 6-5. idRU Identification Label

2. Remove the following connections:
   - Disconnect power to the unit and disconnect the power connector.
   - Label the idRU CPRI cables and disconnect the CPRI cables.
   - Disconnect the coax cable.
   - Disconnect the ground cable.
3. Disconnect the 2x fan-hoods POWER connectors – one power connection per fan-hood.
4. Remove the 4x bolts securing the FRONT fan-hood module.

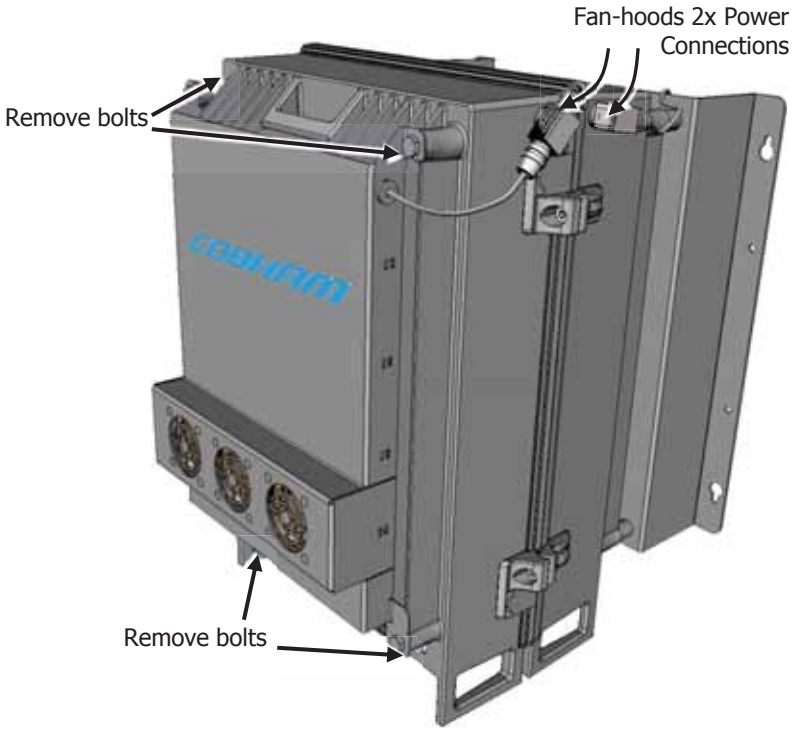


Figure 6-6. Disconnect power Connections and Disassemble Front Fan-hood

5. Remove the FRONT fan-hood module.
6. If external alarms are connected, referring to Section 5.7.1, disconnect the external alarms as follows:
   - If the external alarms are connected to an external power source, disconnect the power.
   - Unlock and open the repeater door.
   - Label all *externally connected wires* connected to the alarms block. (These are pairs of wires routed via the External Alarms aperture on the repeater.)
   - Loosen the relevant screws on the alarms block and remove the wires.
   - Pull the external alarms wires cable out through the external alarms aperture.
   - Close and lock the repeater door.
7. Loosen the 4x fixing bolts securing the repeater to the WALL, and dismount the repeater TOGETHER with the REAR fan-hood and brackets assembly.

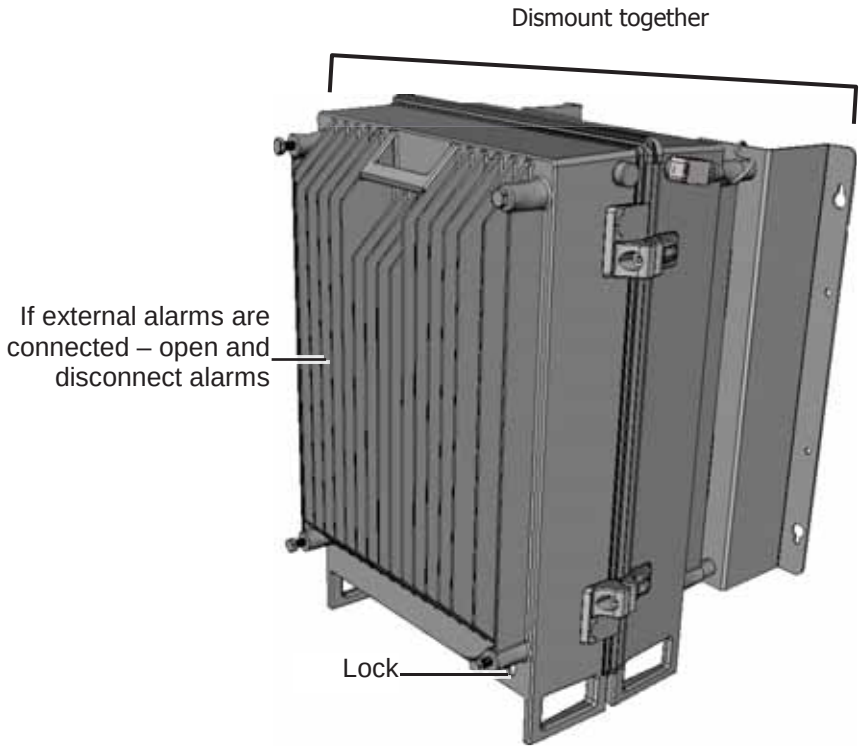


Figure 6-7. Front Fan Hood Removed

8. Place the repeater and rear fan-hood assembly on a flat surface, rear fan-hood assembly facing up as illustrated in Figure 5-10.

9. Loosen the 4x screws securing the rear fan-hood and brackets to the repeater.

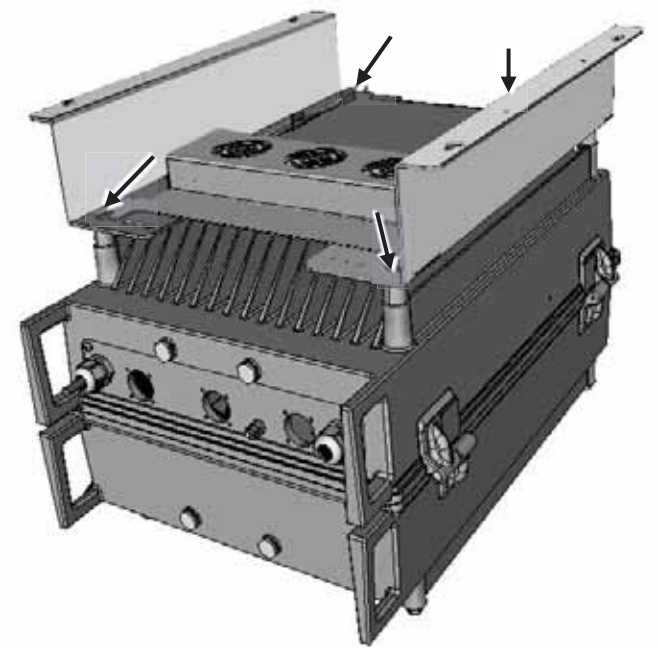


Figure 6-8. Removing Rear Fan-hood and Mounting Brackets

10. Remove the rear fan-hood and brackets.
11. Clean the repeater fins using the standard telecom equipment cleaning procedure used at your installation site.
12. Referring to Section 5.4.2, assemble the NEW fan-hoods and brackets by reversing the steps:
    - Assemble the rear fan-hood and the brackets using the 4x supplied bolts and washers.
    - Turn the repeater over and assemble the front fan-hood using the 4x supplied bolts and washers.
    - Connect the fan-hoods power connections.
13. Referring to Section 5.5.2.2, mount the repeater and fan-hoods assemblies on the wall and tighten the bolts.
14. Referring to Section 5.6, reconnect the cables in the following order:
    - Ground the repeater.
    - Connect the antenna.
    - Clean the CPRI cable(s) and MAIN/AUX SFPs and connect as labeled.
15. If relevant, referring to Section 5.7.1 connect the external alarms as follows:
    - Open the repeater door.
    - Route the alarms wires through the External Alarms connector and opening.
    - Connect the wires according to the labels.
    - Secure the Ext Alarms interface, close the repeater door and secure the repeater.
16. Connect power to the repeater (and if relevant to the external alarms.)

17. Verify the **LINK-MAIN** LED is green – this is the LED to the right of the MAIN CPRI interface (it may be mislabeled on some units).

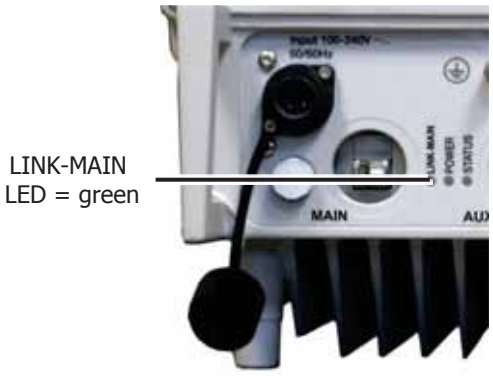


Figure 6-9. LINK-MAIN LED

18. In the web GUI – Click on the **Inventory** hover-menu option and verify the repeater four-digit **ID** is displayed (Section 6.9.3).

6.7.2 idRU Replacement Procedures

This section includes the following replacement procedures:

- idRU-40 replacement
- idRU-30 replacement

> ⚠ ATTENTION! Before reconnecting CPRI cables, be sure to clean the CPRI cable and SFP interfaces using standard fibre cleaning procedures. See Section 6.10.

6.7.2.1 idRU-40 Replacement

> ⚠ CAUTION! It is recommended that two people lift the repeater since (depending upon the configuration) the idRU weighs between 20 and 38 kg (44 and 84 lb).

If the new unit is of exactly the same model and configuration as the previous unit, the Clone option can be used to transfer the configuration from the suspect unit to the new unit after the physical installation.

To replace the idRU-40

1. Record the serial number and four-digit identification of the suspect repeater – located on the label at the side of the repeater. This will be needed when shipping the repeater for service.

Figure 6-10. idRU Identification Label

2. Unpack the replacement idRU and set it aside on a flat clean surface. Be sure to save the packaging for transporting the suspect idRU.
3. Referring to Section 6.7.1 **Step-3** to **Step-10**, uninstall the suspect idRU as follows:
   - Disconnect power.
   - Disconnect the antenna cable.
   - Label and disconnect the CPRI cables.
   - Remove the front fan-hood and set it aside – save bolts and washers for reuse.
   - Remove the Ground connector.
   - If any external alarms are connected – disconnect power to the alarms, open the repeater door, label the wires routed via the Ext Alarms aperture, disconnect the alarm wires and pull them through the aperture.
   - Loosen the four mounting bolts, dismount the suspect repeater along with the rear fan-hood and wall brackets as a unit, and place the COMPLETE ASSEMBLY on a flat surface.
   - Disassemble the rear fan-hood and wallmount brackets and set them aside – save bolts and washers for reuse.
   - Clean the external surface of the suspect repeater of dust and pack it in the packaging from the new repeater for transport.
4. Referring to Section 5.4.2, assemble the previously removed fan-hoods and brackets:
   - Assemble the rear fan-hood and the brackets using the 4x bolts and washers previously set aside.
   - Turn the repeater over and assemble the front fan-hood using the 4x bolts and washers previously set aside.
   - Connect the fan-hoods power connections.
5. Referring to Section 5.5.2.2, mount the repeater and fan-hoods assemblies on the wall and tighten the bolts.
6. Note the four-digit identification of the new repeater on the repeater label.
7. Referring to Section 5.5.2.2, reconnect the cables in the following order:
   - Ground the repeater.
   - Connect the antenna.
   - Clean and connect the CPRI cables to the MAIN/AUX connectors according to the labels.
   - If relevant, connect the External Alarms by opening the repeater door, routing the External Alarms cable internally and connecting the wires according to the labels.
   - Connect power.
8. Verify the **LINK-MAIN** LED is green – this is the LED to the right of the MAIN CPRI interface (it may be mislabeled on some units).

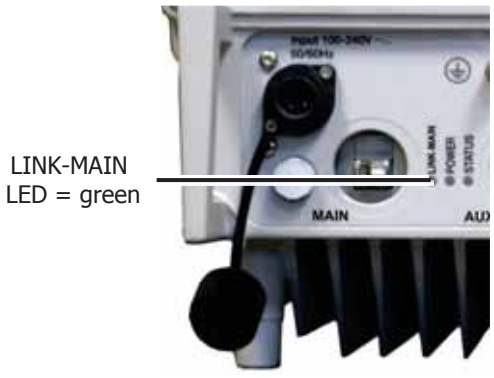


Figure 6-11. LINK-MAIN LED

9. In the web GUI:

- If the idRU is replaced by a unit of the *same model*, this is automatically identified by the system and the configuration of the replaced unit can be transferred to the new equipment using the Clone option. Section 6.9.2.
- Click on the **Inventory** hover-menu option and verify the repeater four-digit **ID** is displayed. Section 6.9.3.

6.7.2.2 idRU-30 Replacement

This section provides basic information on the replacement procedure. For detailed information, refer to Chapter 5.

If the new unit is of exactly the same model and configuration as the previous unit, the Clone option can be used to transfer the configuration from the suspect unit to the new unit after the physical installation.

To replace the idRU-30

1. Unpack the replacement idRU and set it aside on a flat clean surface. Note if new brackets are included with your repeater accessories. *Be sure to save the packaging for transporting the suspect idRU.*
2. Record the serial number of the suspect repeater. The serial number is located externally on the repeater side panel. This will be needed when shipping the repeater for service.
3. Disable the routing profile (Section 6.9.1).
   - Open an idDAS web GUI session.
   - Click the **Routing Profiles** hover-menu option and select the '**disabled**' routing profile option. This disables all routing profiles.
4. Uninstall the suspect idRU:
   - Disconnect power.
   - Label and disconnect the RF connector(s).
   - Label and disconnect the CPRI connectors.
   - If any external alarms are connected – disconnect power to the alarms (if powered by an external power source), open the repeater door, label and disconnect the alarm wires and pull through the Ext Alarms aperture.
   - Disconnect the GND connector.
   - Loosen the repeater mounting bolts, dismount the suspect repeater along with its brackets and place the COMPLETE ASSEMBLY it on a flat, firm and clean surface.
   - Remove the mounting brackets.

     NOTE: If new brackets are provided with your new repeater, use the new brackets, bolts and washers; otherwise, set aside the brackets, bolts and washers for reuse.

   - Clean the external surface of the suspect repeater of dust and pack it in the packaging from the replacement repeater for transport.
5. Referring to Section 5.4, assemble the brackets according to your installation type: rack mount or wallmount.
6. Referring to Section 5.5.2.2, reconnect the cables in the following order:
   - Ground the repeater.
   - Connect the antenna.
   - Clean and connect the CPRI cables and MAIN/AUX SFPs and reconnect according to the labels.

- If relevant, connect the External Alarms by opening the repeater door, routing the External Alarms cable internally and connecting the wires according to the labels. Close and secure the repeater door.
- Connect power.

7. Verify the **LINK-MAIN** LED is green – this is the LED to the right of the MAIN CPRI interface (it may be mislabeled on some units).

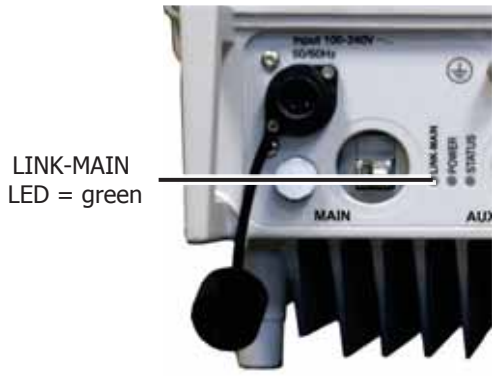


Figure 6-12. LINK-MAIN LED

8. In the web GUI:
   - If the idRU is replaced by a unit of the *same model*, this is automatically identified by the system and the configuration of the replaced unit can be transferred to the new equipment using the Clone option. Section 6.9.2.
   - Click on the **Inventory** hover-menu option and verify the repeater four-digit **ID** is displayed. Section 6.9.3.
   - Click the **Routing Profiles** hover-menu option and re-enable the relevant routing profile. Section 6.9.1

6.8 APOI Replacement Procedures

This section provides the following information:

- APOI BTS Card (BTSC) replacement
- APOI Control Module replacement
- APOI chassis replacement

6.8.1 General Information

Note the following:

- Required tool: T8 star screwdriver, torque for securing modules: 078 Nm
- All replaceable APOI modules are hot swappable.
- After replacing a suspect module, you will be instructed to open a session to the APOI and perform the relevant configuration procedures.
- If a BTSC module is *added* to the chassis (i.e. additional band or sectors are added), it is required to perform the relevant commissioning procedures: these include quota allocation, BTS Port configuration, etc. The configuration procedures are described in the idDAS Commissioning Guide and are not within the scope of this manual.

6.8.2 APOI RF Module (BTSC) Replacement

To replace an APOI RF module

1. Remove the suspect RF module as follows:
   - Label the RF connections for that module to facilitate reconnection.
   - Disconnect the RF connections to the suspect module.
   - Using the T8 screw driver, loosen the 4x captive screws, and gently and evenly pull the suspect module out by its tab (located above the bottom screws).
   - Place the suspect module in the packaging of the new module.

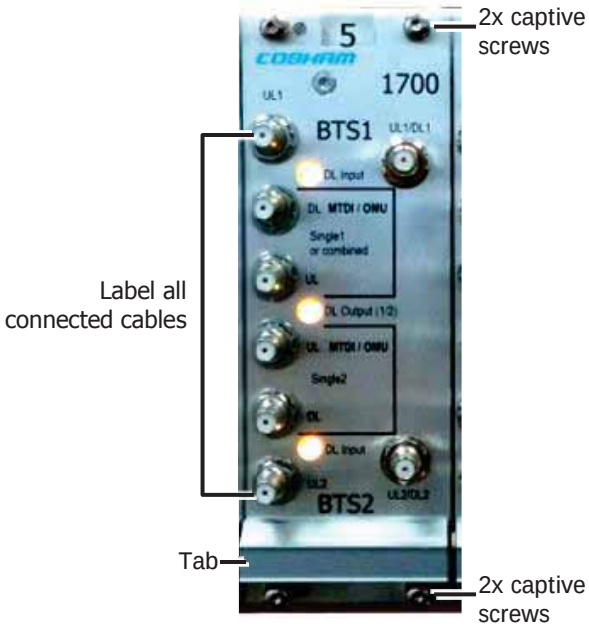


Figure 6-13. Removing RF Modules

2. Install the new module as follows:
   - Gently but firmly insert the new module in the *same slot* of the suspect module and tighten the captive screws using a torque of 078 Nm.
   - Reconnect the RF cables.
3. Configure the new APOI RF module in the idDAS web GUI according to Section 6.9.5.1. No other configuration is required.
4. Verify the BTSI DL Input and DL Output LEDs = steady green

6.8.3 APOI Control Module Replacement

This section describes how to replace a suspect APOI Control module. The replacement process includes the following web management operations:

- Backing up the configuration of the APOI
- Configuring the APOI IP address in the new Control module
- Manually adding the APOI IP Address to the idDAS management application
- Restoring the backed up configuration to the new Control module

Where relevant, references will be made to the corresponding sections describing the implementation of each procedure.

To replace an APOI Control module

1. The ID of the suspect Control module will be required for the replacement procedure. Note the ID provided by the suspect APOI Control module by doing the following:
   - Open a session to the idDAS web management application.
   - Access the **Inventory** screen and note the **ID** of the APOI hosting the suspect Control module. Refer to Section 6.9.3 for details.
2. Open a session to the APOI and back-up the configuration of the APOI using the Cluster level Configuration Backup and Restore option. Refer to following sections:
   - Section 6.9.6.1 for a description of the APOI Cluster Level Backup and Restore options
   - Section 6.9.6.3 for instructions on how to perform the configuration backup
3. Remove the suspect Control module as follows:
   - Disconnect the **Ethernet jumper** connecting the **Control module Eth port** to the adjacent **Display and Switch Module.** (There is no need to label the cable).
   - Using the T8 screw driver, loosen the 2x captive screws, and gently and evenly pull the suspect Control module out by its bottom tab.
   - Place the suspect module in the packaging of the replacement module.

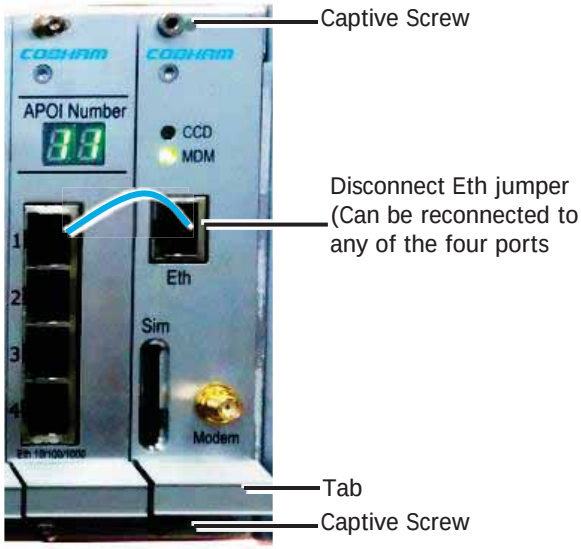


Figure 6-14. Removing the Control Module

4. Gently but firmly insert the new Control module in the *same slot* previously occupied by the suspect module and tighten the x2 captive screws using a torque of 078 Nm. (Do not reconnect the Eth jumper at this point).
5. Referring to Figure 6-15, determine the IP to be assigned to the new Control card as follows:
   - Access the idDAS **Inventory** screen according to Section 6.9.3.
   - Note the **MSDH-M** IP Address.

- Analyzing the currently allocated internal IP Addresses, choose a NEW IP address (not currently listed) that is within the range of the MSDH IP Address. This address will be assigned to the NEW Control card.

  For example: If MSDH 10.0.0.1 assigned 10.0.2.1 to 10.0.0.8, then 10.0.2.9 would be available to assign to the APOI Control module.

Figure 6-15. Determining an Available IP Address

6. Referring to Section 6.9.5.2, open a direct session to the APOI by connecting to the **Control** card **Eth port**, and configure the new IP Address for the APOI.
7. Reconnect the **Eth jumper** between the **Control** module **Eth port** and to *any one* of the Eth ports on the **Switch and Display** module.

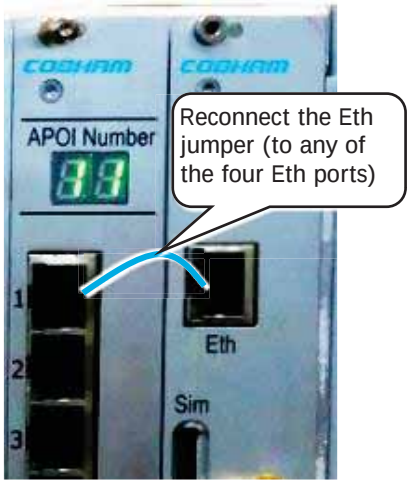


Figure 6-16. Reconnecting the Eth Jumper

8. Perform the following configuration procedures:
   - Referring to Section 6.9.5.3, manually add the APOI IP into the idDAS management system.
   - Referring to Section 6.9.2, restore the previously backed-up APOI configuration to the NEW APOI Control card.
9. Configure the previously noted five-digit ID of the suspect Control card.
10. Verify the Control Module CCD status LED = blinking green.

6.8.4 APOI Chassis Replacement

This section provides basic information on replacing the APOI chassis.

Note the following:

- An APOI chassis with one power supply can be transparently replaced by APOI chassis with two power supplies and vice versa.
- Be sure to note the slot numbers in which all the modules are located and reinsert them in the new chassis in exactly the same order.

To replace an APOI chassis

1. Unpack the replacement APOI enclosure and set it aside on a flat clean surface.
2. If you have not already done so, note the slot numbers corresponding to each module. The modules must be inserted in exactly the same order in the new chassis.
3. Uninstall the suspect chassis as follows:
   - Disconnect power.
   - Label and disconnect all the RF connecters.
   - Disconnect the Eth jumper between the Control module and the Display and Switch module (it is not necessary to label the connection).
   - Disconnect the GND connector.
   - Dismount the suspect APOI chassis along with its brackets and place it on a flat surface.
4. Clean the external surface of the suspect APOI chassis of dust and pack it in the packaging of the new APOI for transport.
5. Referring to the relevant section in Chapter 4, install the replacement APOI as follows:
   - Mount the new APOI chassis in the rack.
   - Ground the unit.
6. Referring to Section 6.8.2, reinstall the RF modules *in the same order* in which they were installed in the suspect chassis and reconnect the cables according to the user assigned labels.
7. Install the Control module and the Display and Switch module as follows:
   - Insert both modules in the appropriate slots.
   - Tighten the x2 captive screws of each module using a torque of 078 Nm.
   - Reconnect the Eth jumper between the **Control** module **Eth** port and *any one* of the four Eth ports on the **Display and Switch** card
8. Verify the front panel LEDs are as follows:
   - BTSI DL Input and DL Output LEDs = steady green
   - Control Module CCD status LED = blinking green

6.9 Web GUI Operations

The following web GUI operations may be required for some of the maintenance and replacement procedures as indicated in the procedure steps.

- Disabling the routing profile
- Viewing the Inventory screen
- Cloning equipment
- APOI configuration procedures required for maintenance

6.9.1 Disabling the Routing Profile

Some of the maintenance procedures on MTDI and idRU elements require disabling the currently active routing profile. Once the procedure is completed, the routing profile is re-enabled.

To disable the active profile

1. Open an idDAS web GUI session.
2. Click the **Routing Profiles** hover-menu option. The list of available routing profiles appears.
3. For an Admin level user, verify the relevant operator is selected in the **Operator** field. The currently active routing profile is selected for that operator is indicated by the selected radio button (e.g. weekend).

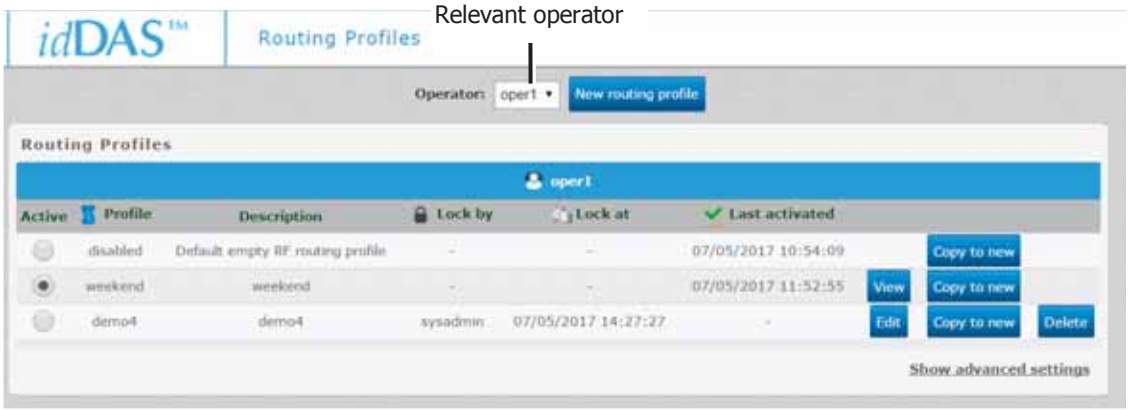


Figure 6-17. Routing Profiles Management Pane

4. To disable the routing profile, select the '**disabled**' routing profile option.

Figure 6-18. Profile Management Options

NOTE: To re-enable the routing profile, access the pane and select the relevant profile.

6.9.2 Cloning Equipment

If an APOI, idRU or MTDI unit is replaced by a unit of the *same model and physical configuration*, the configuration of the replaced unit can be transferred to the new equipment using the Clone option.

After the equipment is replaced and running, the system identifies that the previous equipment has been replaced with equipment of the same model; the Cloning option then becomes available in the idDAS management application, equipment specific Information pane.

To Clone a replaced unit

NOTE: It is assumed that the faulty unit has been physically replaced by a new unit of the *same model.*

1. Access the equipment Information pane:
   - For MTDI or APOI – in the **Topology** view, click on the relevant MTDI or APOI icon. The Information pane of the relevant unit will be displayed by default.
   - For idRU – in the **Topology** view, click on the idRU Zone icon. In the displayed **Connectivity** pane, click on the relevant idRU icon to display its Information pane.

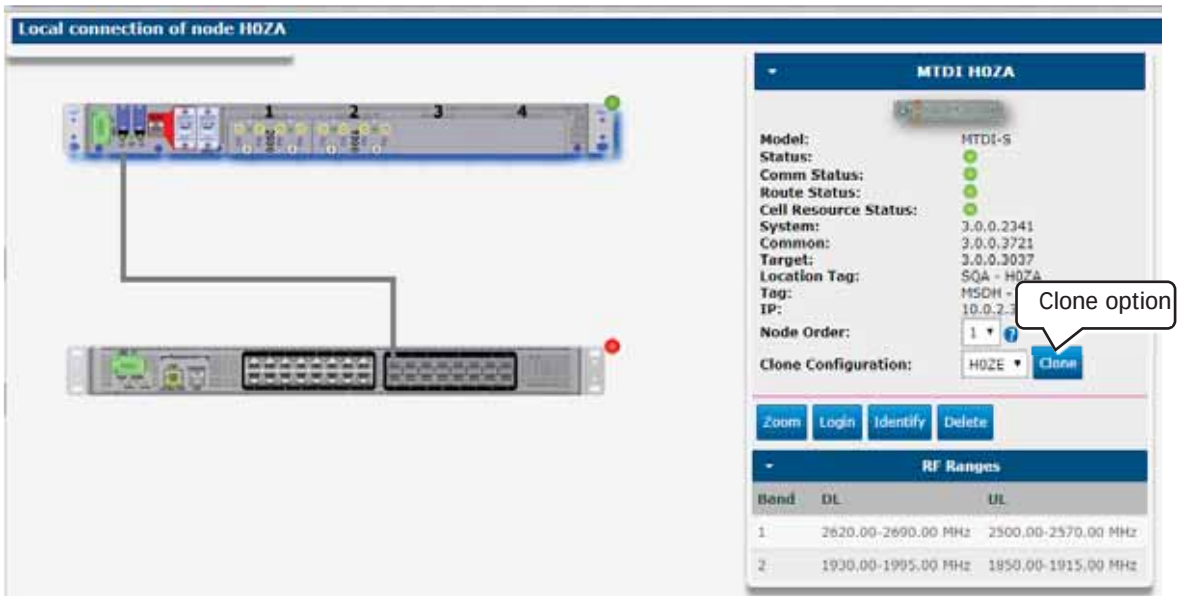


Figure 6-19. Example of Clone Option in the MTDI Information Screen

2. In the **Clone Configuration** field – choose the identification of the equipment that was replaced.
3. Click the **Clone** button.
4. When the information from the previous equipment has been updated onto the new unit, a notification indicating successful completion of the operation appears.
5. Click **OK** to close the dialog. The new equipment information dialog will be displayed WITHOUT the Clone options.

6.9.3 Inventory Screen

During the replacement procedures, the Inventory screen can be used to verify that the unit has initiated properly and is identified by the system according to its four-digit unique **ID**.

To access the Inventory screen

Click the hover-menu **Inventory** option. The list of idDAS elements appears. Each element is displayed along with identifying information, including its unique 4-digit, or 5-digit ID.

The filter options can be used to limit the display to specific elements.

Figure 6-20. Verifying Device Detection and Status

6.9.4 Configuration Restore

A configuration file can be restored from the MSDH. If it is stored in another location, it must first be uploaded to the MSDH before it is restored.

NOTE: Configuration backup is described in Section 6.5.1.

To restore a backed-up configuration file

1. In the hover-menu, under **System Administration**, select the **Configuration Backup** option. The Configuration Backup dialog appears.

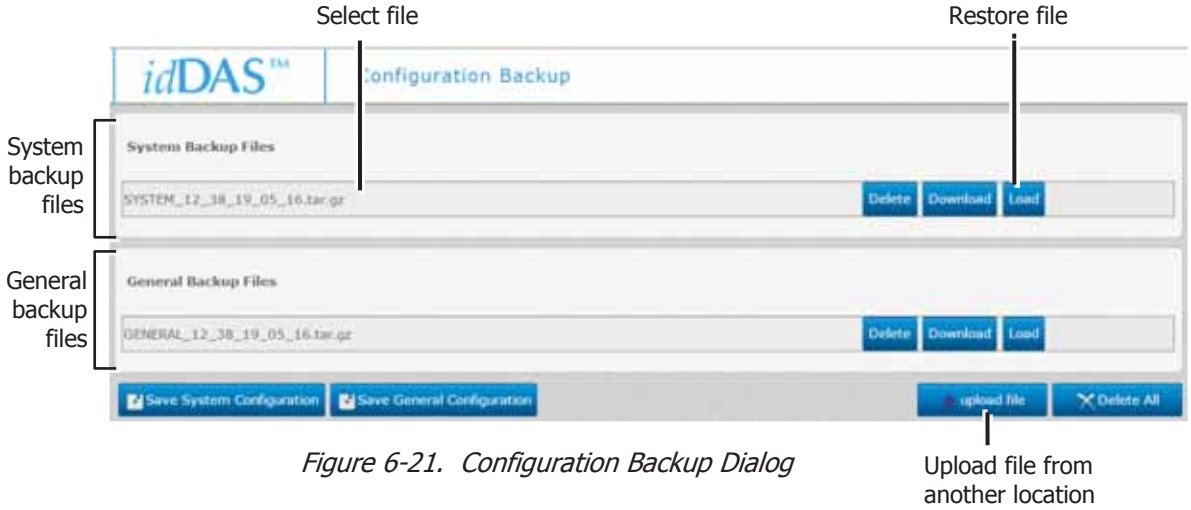


Figure 6-21. Configuration Backup Dialog

2. To restore a configuration file:
   - If the file is not uploaded in the MSDH (i.e. listed under the relevant window area - **System Backup Files** and/or **System Configuration files**, click **Upload File**, browse and upload the relevant file.
   - In the relevant window area, select the file and click **Load.** This may take about 30 sec during which time a blank screen will be displayed

6.9.5 APOI Configuration Procedures

This section describes the following APOI configuration procedures

- APOI BTSC configuration
- APOI IP Address configuration
- Manually adding APOI to the idDAS

6.9.5.1 A-POI BTSC Configuration

Each time a BTSC card is replaced or a new BTSC card is added, it is required to configure the new card according to the instructions in this section.

To configure the service RF parameters

1. In the **Inventory** screen (Section 6.9.3), select the APOI shelf unit and click **Login**.
2. Enter the A-POI User Name (default = **admin**) and Password (default = **admin**)

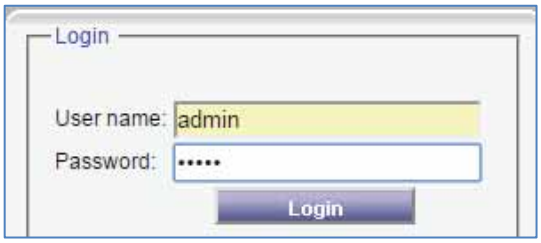


Figure 6-22. APOI Login Dialog

3. In the displayed APOI management window, do the following:
   - In the left pane, click the **A-POI-xx** item.
   - Click the **A-POI Config** tab. The tabular display shows the RF modules according to their slot position (counting from left to right).

Continued on the following page…

- Configure the parameters in the order given in the following steps (the channel is activated last – after all parameters have been set).

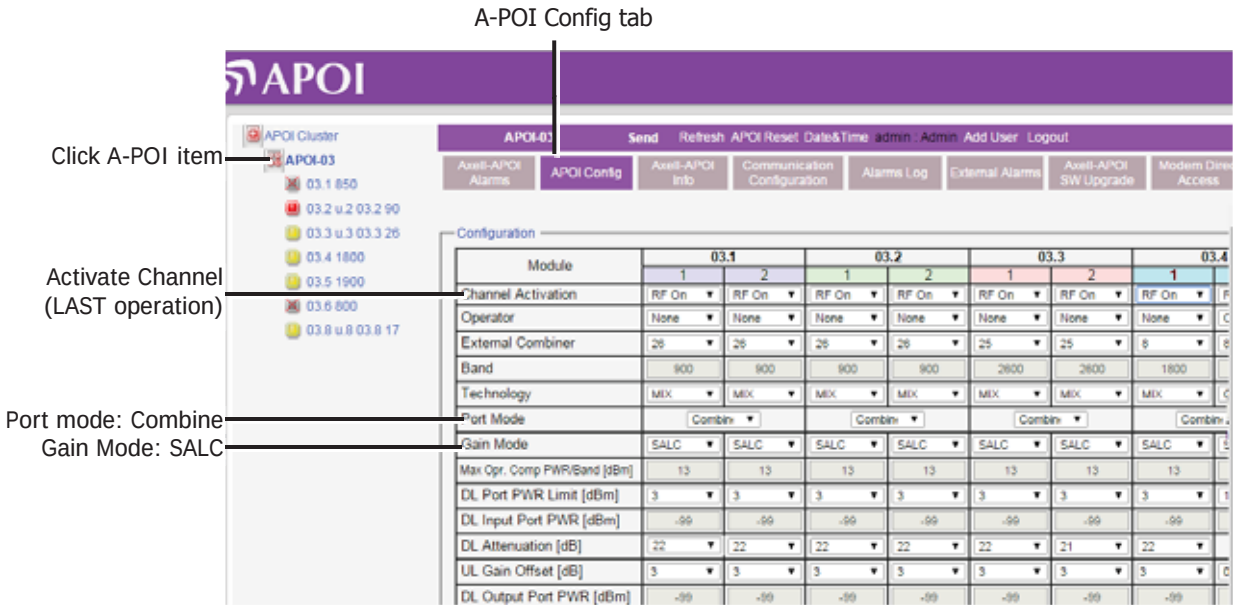
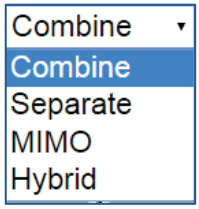
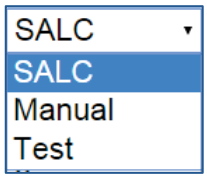


Figure 6-23. A-POI Configuration of Band Modules

4. Select the **Port Mode** for that conditioning module:
   - Combine – (recommended) both services are routed via the top simplex RF connections to the MTDI.
   - Separate – each service is routed via a separate (top or bottom) pair of simplex RF connections to the MTDI.
   - MIMO – for MIMO connections with two base stations; one BTS connected to channel 1 and the other BTS to channel 2.



5. Set the **Gain Mode** to **SALC**. In this mode, the output power level is monitored and controlled automatically to maintain the **Port PWR Limit** value (set to 3 dBm). This is done by the patented Smart Automatic Level Control algorithm. This mode will automatically establish constant gain and constant pilot (or RSRP for LTE) signals in all traffic conditions.



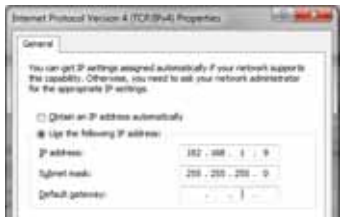
6. Set the **Port Power Limit** to **3 dBm**. This is the power limit when the base station transmits at maximum power.

7. Activate Channels by setting **Channel Activation** to **RF ON** for each channel. Click **Send.**

6.9.5.2 APOI IP Address Configuration

1. Verify your computer's IP Address is in the same subnet as the A-POI IP Address.

   Default A-POI shelf IP Address = **192.168.1.253**.



2. Connect the (supplied) Ethernet cable between the **computer** and the **A-POI Control module CCD** port.

Figure 6-24. Local Setup Connection

3. Open a standard browser and enter the default (provided) IP address of the A-POI: **192.168.1.253**

Figure 6-25. Default IP Address

4. Login:
   - Default User Name: **admin**
   - Default Password: **admin**

   The main window appears.

Figure 6-26, Login Prompt

5. In the **Main** window, **Topology Tree**, click **A-POI** and select the **Communication Configuration** tab (see Figure 6-27).

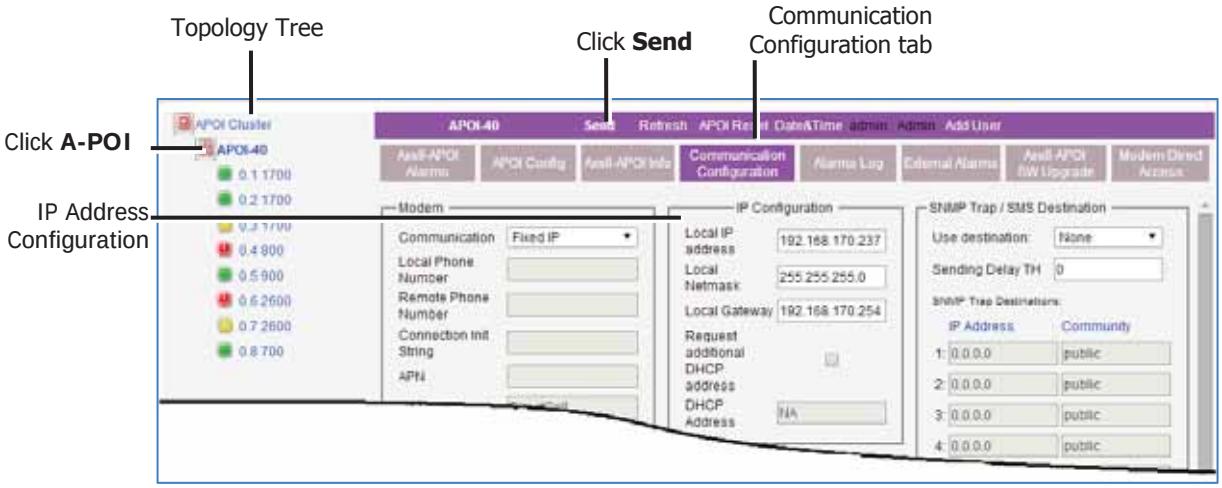


Figure 6-27, IP Address Configuration

6. Configure the shelf IP Address as follows:
   - Define the **Local IP Address**, **Local Netmask** and **Local Gateway** for this A-POI shelf.
   - Click **Send**.

6.9.5.3 Manually Adding A-POIs to the idDAS Management System

Use this procedure to manually add the IP Address of an APOI shelf to the idDAS management system.

NOTE: It is assumed that the APOI IP Address has already been configured, that the APOI management is already connected to the MTDI and that that you have opened an MSDH session.

To configure the A-POI IP Address into the idDAS management system

1. In the hover-menu, under the **Devices** group click on the **APOI Management** item.

   The displayed screen lists the currently integrated A-POIs and provides options for adding or deleting A-POI IP Addresses.

Figure 6-28. List of Integrated APOIs

2. At the top of the screen, click on the **Add APOI** button. The following dialog appears.

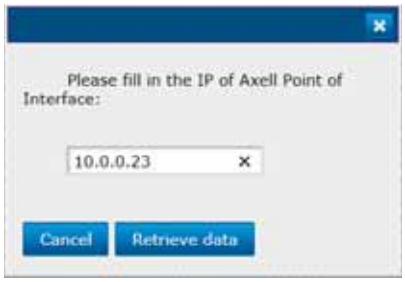


Figure 6-29. APOI IP Dialog Box

3. Enter the **IP** of the APOI you wish to integrate into the system and then click on **Retrieve Data.**

   The following dialog appears. The dialog provides identification information on the APOI, including the list of installed band modules according to their slots.

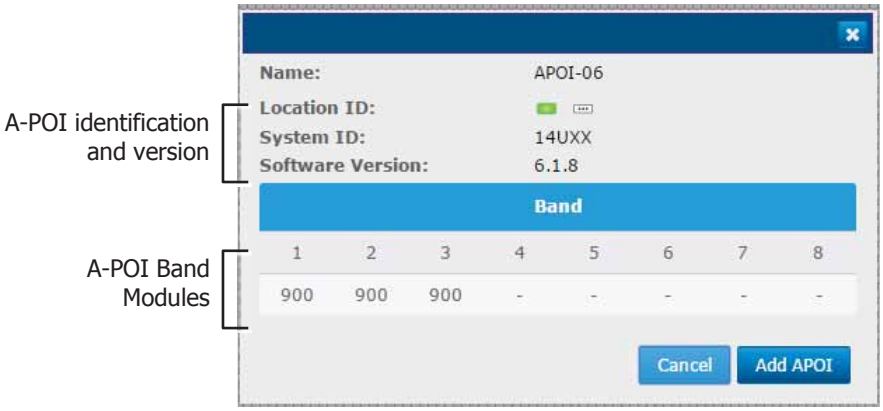


Figure 6-30. APOI Band Modules Details

4. Click **Add-APOI.** The A-POI will now be configured into the idDAS system and listed in the screen.

Figure 6-31. APOI IP List

6.9.6 APOI Configuration Backup/Restore

The APOI supports backup and restore at a Cluster level, and per RF module where specific parameters are backup up at each level. To implement this functionality, a dedicated Backup and Restore tab is available at the Cluster level and for each RF module. The dialogs and available options are identical at both levels.

The corresponding options are backed up to a *.CSV file. By default, the backup file is named according to the current date and time. When generated, the file is saved in the APOI and listed in the relevant Backup and Restore pane.

The file name can be user defined *before* the file is created, using the 'Remark' option; the generated file can be saved to another location by clicking on its link in the list.

Only files stored on the APOI can be restored; therefore, a file saved to another location must first be uploaded to the APOI before it can be restored.

6.9.6.1 Cluster Level Backup and Restore

The cluster level Backup and Restore option is used for backing up the following definitions:

- Operator definitions, external combiner definitions, and power allocation as shown in the **APOI Cluster Operator Allocation** pane.

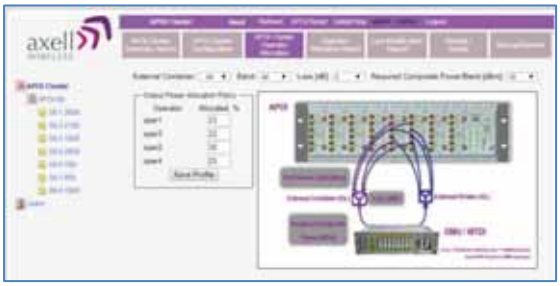


Figure 6-32. Cluster Operation Definitions

- External alarms definitions — these define the PSU alarms relevant for the redundant PSU option.

Figure 6-33. External Alarms Definitions

- Alarm severity definitions – these are either default, or if modified, user allocated severities for each alarm as displayed in the Alarms Configuration tab of any one of the modules.

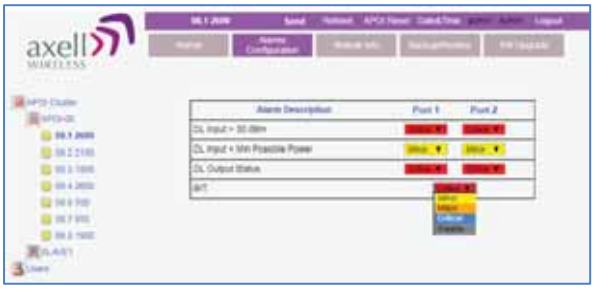


Figure 6-34. External Alarms Definitions

- SNMP related parameters configured in the **Communication Configuration** dialog.

Figure 6-35. SNMP Related Parameters

To access the cluster level backup and restore

The cluster level pane is accessed by clicking the **APOI Cluster** item in the navigation tree and then selecting the **Backup/Restore** tab.

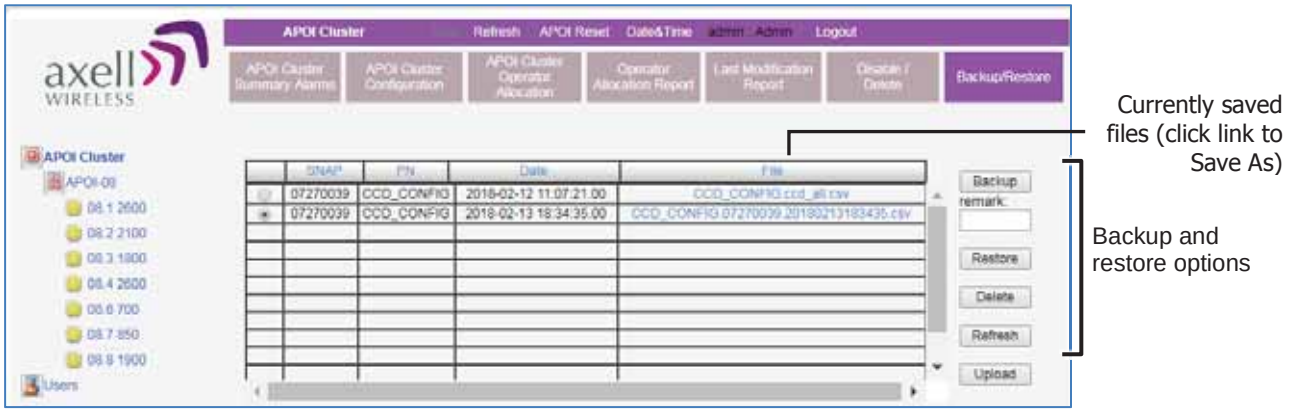


Figure 6-36. Cluster Level Backup and Restore Pane

The file management buttons provide the following options:

ITEM	DESCRIPTION
Backup	Click to save the currently running configuration file to the **Master APOI** control card. The file will be added to the list. A user defined file name can be assigned using the **Remark** option; otherwise, the file will be named according to the current date and time.
Remark	Enables assigning a user defined name to the file *before* it is backed up. The file name cannot be changed once it is created. If a user name is not assigned, the file will be named according to the current date and time.
Restore	Activates the selected configuration file stored on the APOI controller.
Delete	Deletes the selected file from the list.
Refresh	Refreshes the displayed list of files.
Upload	Enables uploading a configuration file from another location on your computer or the network to the APOI controller. The file will be added to the list. The **Restore** option can then be used to activate the file.
File	Click links to download files and save to a location on your computer or the network.

6.9.6.2 RF Module Level Backup and Restore

The RF module Backup and Restore option is used for backing up the user configurable values per channel: Channel Activation (mute), Operator Name, External Combiner, etc — it does not include, the read values.

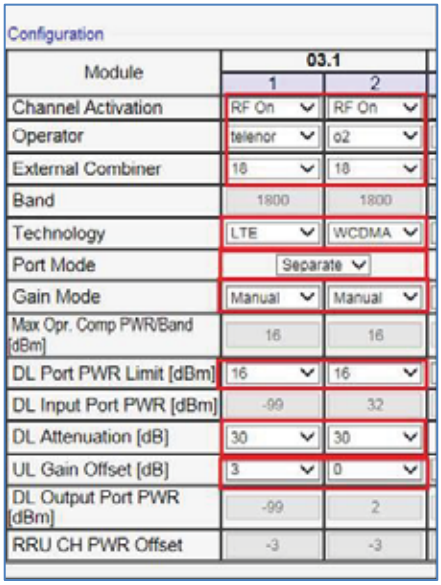


Figure 6-37. Backed Up Module Parameters

To access the RF module level Backup and Restore tab

The RF module Backup and Restore pane is accessed by clicking the relevant RF module in the navigation pane and then selecting the **Backup/Restore** tab.

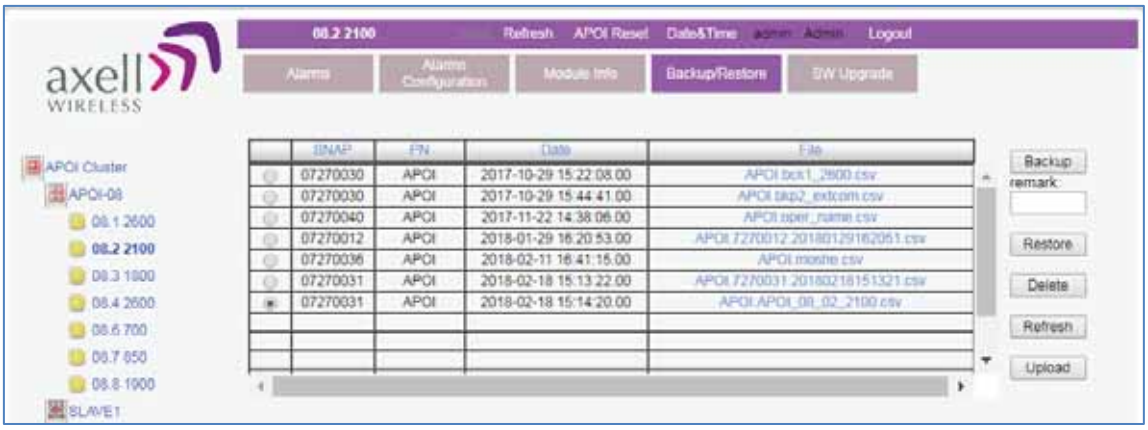


Figure 6-38. Cluster Level Backup and Restore Pane

The file management buttons provide the following options:

ITEM	DESCRIPTION
Backup	Click to save the currently running configuration file to the **Master APOI** control card. The file will be added to the list. A user defined file name can be assigned using the **Remark** option; otherwise, the file will be named according to the current date and time.
Remark	Enables assigning a user defined name to the file *before* it is backed up. The file name cannot be changed once it is created. If a user name is not assigned, the file will be named according to the current date and time.
Restore	Activates the selected configuration file stored on the APOI controller.
Delete	Deletes the selected file from the list.
Refresh	Refreshes the displayed list of files.
Upload	Enables uploading a configuration file from another location on your computer or the network to the APOI controller. The file will be added to the list. The **Restore** option can then be used to activate the file.
File	Click links to download files and save to a location on your computer or the network.

6.9.6.3 Backing Up the Current Configuration

To back-up the current configuration

1. In the left pane, click the **Cluster** item and then click the **Backup/Restore** tab.
2. To assign the configuration file a recognizable name, enter a name in the **remark** field. Otherwise, the file will be assigned a name by the system.
3. Click the **Backup** button located on the right-hand side of the tab. The file will be added to the list displayed in the Backup/Restore tab.

Note: Any file in the list can also be saved to another location on your computer or on the network by clicking the file link.

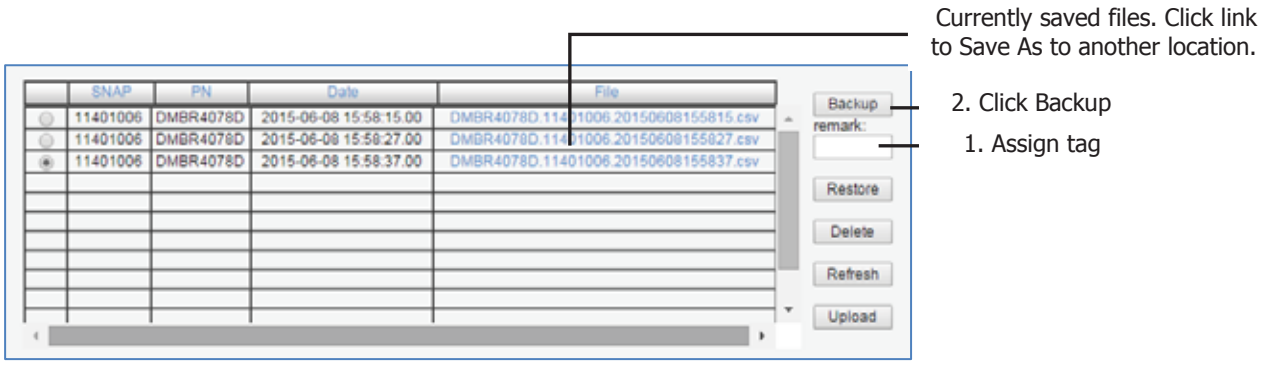


Figure 6-39. Backup Booster Info

6.9.6.4 Restoring a Configuration

Any configuration file listed in the Backup and Restore tab can be restored to the APOI. In order to restore a configuration file that was saved to a different location on your computer or the network, it must first be uploaded to the APOI and displayed in the list.

To restore previous configuration

1. In the left pane, click the **Cluster** item and then click the **Backup/Restore** tab.
2. Verify the desired configuration file is displayed in the list. If the file is saved in a different location, click the **Upload** button, browse for the file and upload to the APOI, verifying that it is displayed in the list.
3. Select the required configuration file from the available list in the Backup/Restore tab, by enabling the adjacent button.
4. Click the **Restore** button to start the restore process, follow and respond appropriately to any prompts.

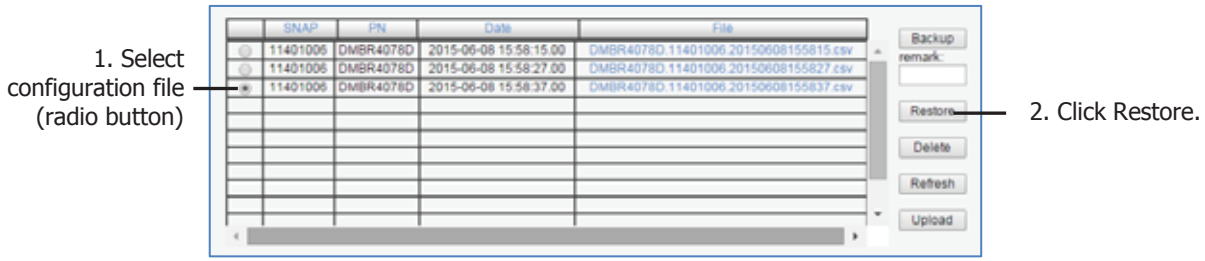
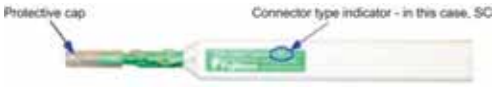


Figure 6-40. Restore Band Configuration

5. Click on the **Control and Params** tab and verify that the required configuration settings are displayed.

6.10 F/O Cleaning Procedure

6.10.1 Tools

TOOL DESCRIPTION	ILLUSTRATION
Fibrescope connected to a PC running the appropriate viewing software. It is highly recommended that some form of Fibre viewing equipment such as a Fibrescope is used to ensure that all Fibre connections are clean before termination; failure to do may downgrade system performance	
Lint-free swabs (box), P/N 99-000127	
Lint-free wipes (pack) P/N 99-000125	
Fujikura "One Click" cleaner P/N 98-900004.	
99% isopropyl alcohol (can), P/N 99-000126	
Cletop type S Cassette Cleaner, P/N 98-900001	

6.10.2 Dry F/O Cleaning Procedure

> CAUTION! Invisible laser radiation might be emitted from disconnected Fibres or connectors. Do not stare into beams or view directly with optical instruments.
> PRUDENCE! *rayonnement laser invisible peut être émis à partir de fibres ou les connecteurs débranchés. Ne pas regarder en faisceaux ou voir directement avec des instruments optiques.*

1. Before cleaning the SFP connectors it is advisable to clean the connector of the mating cable being attached to the optical port.

   An unclean optical connector is often the cause for reduced system performance. A bit of dust or oil from a finger can easily interfere with, or block light. Fortunately, it is very easy to clean the connector. Be sure to use the correct procedure for the given connector. When disconnected, cap the SC/APC connector to keep it clean and prevent scratching the tip of the ferrule.

Use a product specially designed for the purpose, such as the Cletop type S Cassette Cleaner.

2. Begin by dry cleaning the F/O bulkhead connector (shown below is the Fujikura One-Click in use).

> IMPORTANT! Always make sure there is a way of inspecting the connector after cleaning. Cleaning can actually leave the end-face in a worse condition, since alcohol residue is one of the most difficult contaminants to remove.
> IMPORTANT! *Assurez-vous toujours il y a une façon d'inspecter le connecteur après le nettoyage. Le nettoyage peut en réalité laisser l'extrémité-face dans un état pire, car le résidu d'alcool est l'un des contaminants les plus difficiles à éliminer.*

3. Remove the protective cap from the cleaning-head end of the "One Click" cleaner, lift the protective end-cap on the Fibre connector and offer-up the end to the Fibre connector

4. With the cleaning-head end fully engaged in the connector, push until an audible "click" is heard
5. Without fully withdrawing the cleaning head end push it in again twice more, each time until an audible "click" is heard.
6. Withdraw the "One Click" cleaner and replace the protective end cap.

7. Inspect the Fibre connector using a Fibrescope. On the PC monitor, verify that there is no contamination present on the connector end-face.
8. If the connector is dirty, clean it with a wet cleaning technique followed immediately by dry cleaning. This is to remove any remaining residue from the wet clean (the following steps demonstrate a wet cleaning technique).

6.10.3 Wet F/O Cleaning Procedure

ATTENTION! Invisible laser radiation might be emitted from disconnected fibres or connectors. Do not stare into beams or view directly with optical instruments.
PRUDENCE! *rayonnement laser invisible peut être émis à partir de fibres ou les connecteurs débranchés. Ne pas regarder en faisceaux ou voir directement avec des instruments optiques.*

1. Lightly moisten a new lint-free wipe with 99% isopropyl alcohol. (Step 1 below).

TIP: Have a dry lint-free swab available for immediately drying after performing the wet-cleaning.

2. Lightly press and turn a clean lint-free swab in the moistened area of the wipe to moisten the swab. It is important that the swab is not too wet. (Step 2 below).
3. Insert the moistened lint-free swab into the bulkhead adapter. Lightly press and rotate several times in the same direction. (Step 3 below).

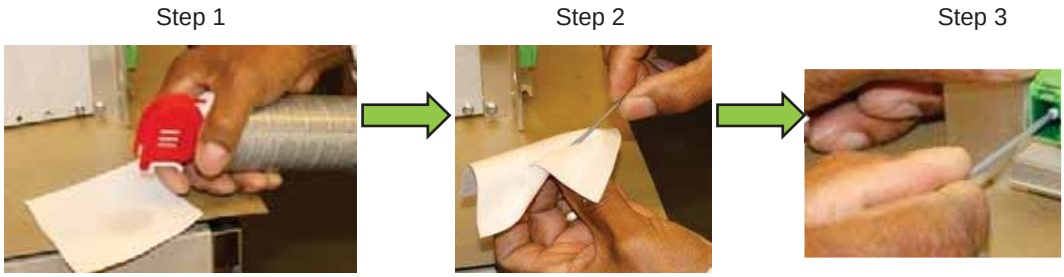


Figure 6-41: Wet-Cleaning Technique

4. Immediately use a dry lint-free swab to clear any remaining alcohol residue.

NOTE: Do **not** re-use any of the wipes and/or swabs. Dispose of them properly.

5. Follow steps 3 to 6 of Dry Cleaning above
6. Re-inspect the Fibre using the Fibrescope. On the PC monitor, verify that there is no contamination present on the connector end-face.
7. If the Fibre is still dirty, go back to step 1 (Wet Cleaning) and repeat the entire process.

NOTE: The entire wet/dry cleaning cycle should only be used twice, if the Fibre is still dirty after two cycles of wet/dry cleaning seek advice from the Cobham Wireless Support Desk.

7 Specifications

The chapter provides the following information:

- Supported Cellular and Public Safety frequencies
- Headend units specifications
- Cellular idRUs specifications
- Public Safety idRUs specifications

7.1 Supported Frequencies

7.1.1 EMEA/APAC Frequencies

EMEA/APAC APOI, MTDI, idRU (Cellular) Bands

The frequencies listed below are supported by APOI, MTDI, and idRU[1].

FREQUENCY RANGE	UPLINK	DOWNLINK
800 MHz	832-862 MHz	791-821 MHz
900 MHz	880-915 MHz	925-960 MHz
1800 MHz	1710-1785 MHz	1805-1880 MHz
2100 MHz	1920-1980 MHz	2110-2170 MHz
2300MHz (TDD)	2300-2400 MHz	
2600 MHz	2500-2570 MHz	2620-2690 MHz

EMEA/APAC MTDI, idRU (Public Safety) Bands

The frequencies listed below are supported by MTDI, and idRU[1].

FREQUENCY RANGE	UPLINK	DOWNLINK
400 MHz([2])	380-385 MHz 385-390 MHz 410-415 MHz 415-420 MHz 450-455 MHz 455-460 MHz	390-395 MHz 395-400 MHz 420-425 MHz 425-430 MHz 460-465 MHz 465-470 MHz
800 MHz	832-862 MHz	791-821 MHz
900 MHz GSM-R[2]	876-880 MHz	921-925 MHz
900 MHz	880-915 MHz	925-960 MHz
1800 MHz	1710-1785 MHz	1805-1880 MHz
2100 MHz	1920-1980 MHz	2110-2170 MHz
2300MHz (TDD)	2300-2400 MHz	
2600 MHz	2500-2570 MHz	2620-2690 MHz

[1] Other bands such as 700MHz, 3500MHz in process

[2] Other frequency bands on 400MHz can be provided upon request

7.1.2 Americas Frequencies

AMERICAS FREQUENCIES	UPLINK	DOWNLINK
700 LTE Lower band	698-716 MHz	728-746 MHz
Upper band	776-787 MHz	746-757 MHz
800 MHz (Sprint)	817-824 MHz	862-869 MHz
850 MHz (Cellular)	824-849 MHz	869-894MHz
1700 MHz (AWS) (Detailed below)	1710-1755 MHz	2110-2155 MHz
1700 MHz (AWS1 +3)	1710-1780 MHz	2110-2180 MHz
1900 MHz (PCS) (Detailed below)	1850-1915 MHz	1930-1995 MHz

PCS BAND BLOCKS				
BLOCK NAME IN GUI	UL FREQ START MHZ	UL FREQ STOP MHZ	DL FREQ START MHZ	DL FREQ STOP MHZ
PCS-A	1850	1865	1930	1945
PCS-D	1865	1870	1945	1950
PCS-B1	1870	1875	1950	1955
PCS-B2	1875	1880	1955	1960
PCS-B3	1880	1885	1960	1965
PCS-B	1870	1885	1950	1965
PCS-E	1885	1890	1965	1970
PCS-F	1890	1895	1970	1975
PCS-C1	1895	1900	1975	1980
PCS-C2	1900	1905	1980	1985
PCS-C3	1905	1910	1985	1990
PCS-C	1895	1910	1975	1990
PCS-G	1910	1915	1990	1995

AWS BAND BLOCKS				
BLOCK NAME IN GUI	UL FREQ START MHZ	UL FREQ STOP MHZ	DL FREQ START MHZ	DL FREQ STOP MHZ
AWS-A	1710	1720	2110	2120
AWS-B	1720	1730	2120	2130
AWS-C	1730	1735	2130	2135
AWS-D	1735	1740	2135	2140
AWS-E	1740	1745	2140	2145
AWS-F	1745	1755	2145	2155

Americas Public Safety Bands

AMERICAS PUBLIC SAFETY FREQUENCIES	UPLINK	DOWNLINK
SMR 700MHz, D block	788 - 793MHz	758 - 763MHz
SMR 700MHz	793 - 805MHz	763 - 775MHz
SMR 800MHz 10MHz BW (USA)	806 – 816MHz	851 - 861MHz
SMR 800MHz 11MHz BW (USA)	806 – 817MHz	851 - 862MHz
SMR 800MHz 18MHz BW (Full BW)	806 - 824MHz	851 - 869MHz

7.1.3 Additional Supported Frequencies

7.1.3.1 Brazil Frequencies

BRAZIL FREQUENCIES	UPLINK	DOWNLINK
850 MHz	824-849 MHz	869-894 MHz
1800 MHz	1710-1785 MHz	1805-1880 MHz
2100 MHz	1920-1980 MHz	2110-2170 MHz
2600 MHz	2500-2570 MHz	2620-2690 MHz

7.1.3.2 Australia Frequencies

AUSTRALIA FREQUENCIES	UPLINK	DOWNLINK
700MHz	703-748MHz	758-803MHz
850MHz (*)	825-844.7 MHz	870-889.7 MHz
900 (*)	891.7- 915 MHz	936.7 - 960 MHz
1800MHz	1710 - 1785 MHz	1805 - 1880 MHz
2100MHz	1920 - 1980 MHz	2110 - 2170 MHz
2300MHz (TDD)	2300-2400 MHz	
2600MHz	2500 - 2570 MHz	2620 - 2690 MHz

(*) Supporting 850 MHz and 900MHz in the same system requires 2 antenna ports or an external combiner / filter for co-existence.

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7.2 Headend Units Specifications

7.2.1 APOI Specifications

RF PARAMETERS	
Frequencies	See System Frequencies
Gain flatness	3 dB (p-p)
RF input power range	+20 to +30dBm composite power per band
BTSI cards	Up to 8
Sectors per BTSI card	Up to 2
BTS side RF interfaces	4 QMA Connector Female (2 per sector) Simplex / Duplex connections per sector.
DAS side RF interfaces	4 QMA Connector Female (Simplex) 2 sectors can be converged to a single simplex connection
Management	Advanced, Web based, management and control system Management through MTDI
Power feeding	100/240 VAC or 48V DC or 12V DC (bespoke)
Power consumption	A-POI rack with 8 band modules. Fanless configuration. 36W max for all power feed models.
Operating temperature	-5 to +50°C
Dimensions (w x h x d)	445x 132x290 mm in 19" rack
WEIGHT	VAC and 48 V DC models: 20 lbs (9 Kg) 12 V DC models: 17.9 lb (8.1 Kg)
Ingress Protection	IP 20 , indoor unit

7.2.2 MTDI Specifications

RF PARAMETERS	
Frequencies	See System Frequencies
Gain flatness	3 dB (p-p)
RF input power range	From APOI 0dBm composite power per band
Number of Digitization Modules	4 band-specific modules
Max number of sectors per Digitization Module	4 sectors per module (via 2* A-POI band module in combined mode)
RF Ports per module	4 QMA Connector Female Two simplex Tx/Rx connections.
CPRI ports	2 CPRI ports for connection to MSDH and MTDI cascading: • L1- MM connector • L2 –SM connector
Management	2 Ethernet ports: • APOI – A-POI control connection • LAN – idDAS Web Management (local or remote) • Console – USB port for local connection
Power feeding	• 100/240 VAC 50/60 Hz or 48V DC • 12V DC (bespoke)
Power consumption	For MTDI rack with 4-band modules: • 100/240VAC or 48 V DC =140 W • 12V DC = 120W
Operating temperature	-5 to +50°C
Dimensions (w x h x d)	17.5" x 1.75" x 13.5" (445x45x342 mm)*, 1U 19" rack
Weight	VAC and 48 V DC: 11.0 lbs (5.0 Kg) 12V DC models: 9.0 lbs (4.1 Kg)
Ingress Protection	IP 20 , indoor unit

CPRI INTERFACE MEDIA TYPES		DISTANCE	SUPPORTED BANDWIDTH
Single mode fibre	1310, 1550 nm	Up to 80 km	Up to 220 MHz
Multi mode fibre	850 nm	Up to 300 m	Up to 220 MHz

7.2.3 MSDH Specifications

INTERFACES			
CPRI Ports (MTDI/idRU)	16 ports, 10 Gbit/s per port Up to 4 MTDI connections, Software configurable		
SFP Configurations	Up to 16 SFP's – standard range (10 km or below) Up to 8 long range (above 10Km) + up to 8 standard range (10 km or below)		
Ethernet Ports (RJ-45)	16 ports 1 Gbit /s per port Internally connected to the corresponding CPRI ports		
Management	1 RJ45 Ethernet port – idDAS Web management (local or remote) Console – USB port for local connection		
Dry-contact Alarms	For MSDH Public Safety models only: x1 dry-contact output alarm.		
External sync interface	Optional		
Power feeding	100/240 VAC 50/60 Hz or 48V DC 12V DC (bespoke)		
Power consumption	150W for all power feed models.		
Operating temperature	-5 to +50°C		
Dimensions (w x h x d)	17.5" x 1.75" x 13.5" (445x45x342 mm)*, 1U 19" rack		
Weight	VAC and 48 V DC: 12V DC models:	11.0 lbs (5.0 Kg) 9 lbs (4.1 Kg)	
Ingress Protection	IP 20, indoor unit		
CPRI INTERFACE MEDIA TYPES		**DISTANCE**	**SUPPORTED BANDWIDTH**
Single mode fibre	1310,1550 nm	Up to 80 km	Up to 220 MHz
Multimode fibre	850 nm	Up to 300 m	Up to 220 MHz

* For Americas PS DC model, the *depth* dimensions differ as follows: 17.5" x 1.75" x 13.8" (445x45x350 mm).

7.3 idRU EMEA/APAC Specifications

This information below includes both cellular and public safety specification for the EMEA/APAC idDAS system.

FREQUENCY RANGE	UPLINK (UL)	DOWNLINK (DL)	OPERATIONAL BW	HIGH POWER COMPOSITE OUTPUT POWER	MEDIUM POWER COMPOSITE OUTPUT POWER	TECHNOLOGIES (TESTED)
400 MHz[3]	380-385 MHz 385-390 MHz 410-415 MHz 415-420 MHz 450-455 MHz 455-460 MHz	390-395 MHz 395-400 MHz 420-425 MHz 425-430 MHz 460-465 MHz 465-470 MHz	5 MHz	+36dBm (+40dBm optional)	+30 dBm	TETRA/P25
440-450 P25[3] (Bespoke)	441-444 MHz	446-449 MHz	3 MHz	36 dBm DL	30 dBm	
800 MHz[4]	832-862 MHz	791-821 MHz	30 MHz	+40 dBm[5]	+30 dBm	LTE
GSM-R 900 MHz	876-880 MHz	921-925 MHz	4 MHz	+37 dBm[5]	--	GSM[6], WCDMA,LTE
900 MHz	880-915 MHz	925-960 MHz	35 MHz	+40 dBm[5]	+30 dBm	GSM[6], WCDMA,LTE
1800 MHz	1710-1785 MHz	1805-1880 MHz	75 MHz	+43 dBm (w/o GSM)[5] +40dBm (with GSM) [5]	+30 dBm	GSM[6], WCDMA, LTE
2100 MHz	1920-1980 MHz	2110-2170 MHz	60 MHz	+43 dBm[5]	+30 dBm	WCDMA,LTE
2300MHz (TDD)	2300-2400 MHz		100MHz	+43dBm	+30dBm	LTE
2600 MHz	2500-2570 MHz	2620-2690 MHz	70 MHz	+43 dBm[5]	+30 dBm	LTE

Noise Figure	3.5 dB Typical (maximum gain) in Medium power 4 dB Typical (maximum gain) in High power
Ripple	±2 dB
Downlink Power	Adjustable, in 1 dB steps
System Impedance	50Ω
DL Return loss at antenna port	>14dB
Antenna Connectors	4.3-10
No. of CPRI Ports	2 (1 connects to MSDH, 1 to cascade to another idRU)
Max RF bandwidth per CPRI link	220MHz
No. of Ethernet Ports	2 (1 for Ethernet Backhaul, 1 for LAN)
Max throughput for backhul	1 Gbps (combined UL and DL)
No. of Bands	4 (8 when cascading two idRUs)
Cascading	Up to 8 units can be cascaded via CPRI link
No. of antenna ports[7]	1 connector for all bands combined
Electrical ratings	115/220VAC 50/60Hz or 48V DC (30 – 60V DC)[8]
External alarms	4 external inputs , 1 external dry contact output

[3] idRU30/40 Tetra uplink composite power = -14±2 dBm, idRU40 UL/DL Gain =36dB Max, idRU30 UL/DL Gain = 30 dBm Max

[4] idRU30/40 uplink composite power = <-5dBm, idRU40 UL/DL Gain = 40dB Max, idRU30 UL/DL Gain = 30 dBm Max

[5] Composite power PAR 8.5dB for idRU40 using WCDMA/LTE technology

[6] For GSM modulation in idRU 40, ETSI IMD is measured with 2 tones - each is 6dB less than composite power

[7] Other configurations such as MIMO or antenna port per band are possible. In these configurations 4.3-10 connector type will be used. Please contact Cobham Wireless for details.

[8] For id-DAS-idRU-3604A-DC, Eng P/N idRU0037, input voltage = 48V DC (40.5 – 60V DC)

idRU EMEA/APAC Specifications – cont…

CPRI INTERFACE MEDIA TYPES		DISTANCE	SUPPORTED BANDWIDTH
Single mode fibre	1310,1550 nm	Up to 80 km	Up to 220 MHz
Multi mode fibre	850 nm	Up to 300 m	Up to 220 MHz
WCDMA/EVM	Typ. 3.5% RMS (composite according to ETSI TS 25.106 with TM1/64 DPCH		
LTE/EVM	Typ. 3.5% RMS (composite according to 3GPP TS 136 106)		
PkCDE	<-33dB (ETSI TS 25.106 with TM 1/64 DPCH and spreading factor 256)		
Quad band	210W max		690-820W max
Single band	--		193W max
Dimensions	540 x 382 x 198 mm		540 x 382 x 313 mm (without fanhood)
Weight	25 kg		38 kg
Enclosure	Aluminium		
Ingress Protection	IP 65, Outdoor unit		
Operating Temperature	- 10 to + 50° C		
Storage Temperature	- 30 to + 70 ° C		
Humidity	ETSI EN 300 019-2-4		
COMPLIANCE			
Complies in applicable parts, on different markets, to Radio Equipment Directive (RED). Refer to the standards detailed in the Preface Material under 'Standards			

7.4 idRU Americas Specifications

This information below includes both cellular and public safety specification for the Americas idDAS system.

IDRUS AMERICAS CELLULAR RF SPECIFICATIONS							
FREQUENCY RANGE		UPLINK (UL)	DOWNLINK (DL)	OPER. BW	IDRU 40 COMPOSITE OUTPUT POWER	IDRU 30 COMPOSITE OUTPUT POWER	TECHNOLOGIES (TESTED)
700	Lower	698-716 MHz	728-746 MHz	29 MHz	+43dBm[5]	+30dBm	LTE
	Upper	776-787 MHz	746-757 MHz	29 MHz	+43dBm[5]	+30dBm	LTE
800 MHz (Sprint)		817-824 MHz	862-869 MHz	32 MHz	+43dBm[5]	+30dBm	GSM[6], CDMA,WCDMA,LTE
850 MHz (Cell)		824-849 MHz	869-894 MHz	32 MHz	+43dBm[5]	+30dBm	GSM[6],CDMA,WCDMA,LTE
1700 MHz (AWS)		1710-1755 MHz	2110-2155 MHz	45MHz	+43dBm[5]	+30dBm	WCDMA, LTE
1700 MHz (AWS1+3)		1710-1780 MHz	2110-2180 MHz	70MHz	+43dBm[5]	+30dBm	WCDMA, LTE
1900 MHz (PCS)		1850-1915 MHz	1930-1995 MHz	65 MHz	+43dBm[5]	+30dBm	GSM[6],CDMA,WCDMA,LTE

IDRUS AMERICAS PUBLIC SAFETY RF SPECIFICATIONS					
FREQUENCY RANGE	UPLINK (UL)	DOWNLINK (DL)	OPERATIONAL BW	IDRU 40 COMP. OUTPUT POWER	MODULATION
UHF	380-450MHz,9 or 10MHz Duplex 450-470MHz, 5MHz Duplex 470-512MHz, 3MHz Duplex		Up to 8MHz	36 dBm DL -14.5 dBm UL	P25 phase 1 and 2, LTE, Tetra
SMR 700MHz[4]	788-793 MHz 793-805 MHz	758-763 MHz 763-775 MHz	5 MHz 12 MHz	37dBm DL -17 dBm UL	P25 phase 1 and 2, LTE, (Tetra – future option)
SMR 800MHz	806-824 MHz	851-869 MHz	18 MHz	37dBm DL -17 dBm UL	P25 phase 1 and 2, LTE, (Tetra – future option)
Noise Figure	3.5 dB Typical (maximum gain) in Medium power 4 dB Typical (maximum gain) in High power				
Ripple	±2 dB				
Downlink power	Adjustable, in 1 dB steps				
System Impedance	50Ω				
Return loss at antenna port	>14dB				
Antenna Connectors[7]	Mini DIN 4.3-10				
No. of CPRI Ports	2 (1 connects to MSDH, 1 cascades to another idRU)				
No. of Ethernet Ports	2 (1 for Ethernet Backhaul, 1 for LAN)				
No. of Bands	4 (8 when cascading two idRUs)				
Cascading	Up to 8 units can be cascaded via CPRI links				
No. of antenna ports[7]	1 connector for SISO, 2 connectors for MIMO				
Electrical ratings	115/220VAC 60Hz or 48V DC (30 – 60V DC)				
External alarms	3 external inputs , 1 external dry contact output Public Safety idRU (700/800 UHF): 6 wires to fire panel NFPA Alarms: x2 dry-contact alarms with NO/NC options for antenna disconnection and unit failure				

CPRI INTERFACE MEDIA TYPES		DISTANCE	SUPPORTED BANDWIDTH
Single mode fiber	1310,1550 nm	Up to 80 km	Up to 220 MHz
Multi mode fiber	850 nm	Up to 300 m	Up to 220 MHz

[4] idRU40 uplink composite power = <-5dBm, idRU40 UL/DL Gain = 40dB Max

[5] Composite power PAR 8.5dB for idRU40 using WCDMA/LTE technology

[6] For GSM modulation in idRU 40, ETSI IMD is measured with 2 tones - each is 6dB less than composite power

[7] Other configurations such as MIMO or antenna port per band are possible. In these configurations 4.3-10 connector type will be used. Please contact Cobham Wireless for details.

MODULATION ACCURACY AT NOMINAL OUTPUT POWER		
WCDMA/EVM	Typ. 3.5% RMS (composite according to ETSI TS 25.106 with TM1/64 DPCH	
LTE/EVM	Typ. 3.5% RMS (composite according to 3GPP TS 136 106)	
PkCDE	<-33dB (ETSI TS 25.106 with TM 1/64 DPCH and spreading factor 256)	

Quad band	max 210W	690-820W max
Dimensions	21.3" x 15" x 7.8" 540 x 382 x 198 mm	21.3" x 15" x 12.3" 540 x 382 x 313 mm (without fanhood)
Weight	25 kg (max)	38 kg (max)
Enclosure	Aluminium (IP65)	
EMC	FCC, IC	
Operating Temperature	- 10 to + 50°C	
Storage Temperature	- 30 to + 70°C	
Humidity	ETSI EN 300 019-2-4	

8 Ordering Information

This chapter provides ordering information for the following elements

- EMEA Cellular and Public Safety elements
- Americas Cellular and Public Safety
- Bespoke public safety solutions
- SFPs and Jumpers

8.1 EMEA/APAC Ordering Information

8.1.1 EMEA/APAC Cellular

8.1.1.1 EMEA/APAC Cellular APOI P/N

APOI MARKETING P/N	DESCRIPTION	ENG. NUMBER
APOI-CH-AC-CN	APOI chassis AC feed, includes controller	POI0001
APOI-CH-48V DC-CN	APOI chassis 48 DC feed, includes controller	POI0002
APOI-CH-AC-R-CN	APOI chassis AC feeding redundant PS, includes controller	POI0003
APOI-CH-48V DC-R-CN	APOI chassis 48 V DC feeding redundant PS, includes controller	POI0004
APOI-BTSI-800LTE	APOI BTS interface 800LTE	OT00081
APOI-BTSI-900	APOI BTS interface 900MHz	OT00082
APOI-BTSI-1800	APOI BTS interface 1800MHz	OT00083
APOI-BTSI-2100	APOI BTS interface 2100MHz	OT00084
APOI-BTSI-2600	APOI BTS interface 2600MHz	OT00085
APOI-BLNK-PNL	APOI blank panel	MA00094
APOI-QMA-JUMPER-70CM	APOI QMA-QMA jumper 70 cm	1579100299
APOI-T864-MDM	APOI CCD (controller module), includes Telit 864 WCDMA modem	OT00077
APOI-SW-DISP	APOI switch and Display card	OT00090

8.1.1.2 EMEA/APAC Cellular MTDI P/N

MTDI MARKETING P/N	DESCRIPTION	ENG. NUMBER
id-DAS-MTDI-4-CH-SM-MM-48V DC	id-DAS MTDI 4 CH 1 SM & 1 MM SFP 48V DC	MTDI003
id-DAS-MTDI-4-CH-SM-MM-AC	id-DAS MTDI 4 CH 1 SM & 1 MM SFP AC	MTDI004
id-DAS-RFB-800LTE	id-DAS RF board 800LTE	RA00130
id-DAS-RFB-900	id-DAS RF board 900MHz	RA00131
id-DAS-RFB-1800	id-DAS RF board 1800MHz	RA00132
id-DAS-RFB-2100	id-DAS RF board 2100MHz	RA00133
id-DAS-RFB-2600	id-DAS RF board 2600MHz	RA00134

8.1.1.3 EMEA/APAC Cellular MSDH P/N

MSDH MARKETING P/N	DESCRIPTION	ENG. NUMBER
id-DAS-MSDH-48V DC	id-DAS MSDH 48V DC feeding	MSDH005
id-DAS-MSDH-AC	id-DAS MSDH AC feeding	MSDH006

8.1.1.4 EMEA/APAC Cellular idRUs P/Ns

EMEA/ IDRU MARKETING P/N	DESCRIPTION	ENG. NUMBER
id-DAS-idRU-M-3008-3009-3018-3026-AC	id-DAS idRU Master 8/9/18/26 30dBm AC	RRU0001
id-DAS-idRU-M-3008-3018-3021-3026-AC	ID-DAS idRU Master 8/18/21/26 30dBm AC	RRU0002
id-DAS-idRU-M-4008-4009-4018-4326-AC-F	ID-DAS idRU Master 40/40/40/43 dBm 8/9/18/26AC FH	RRU0007
id-DAS-idRU-M-4008-4018-4321-4326-AC-F	ID-DAS idRU Master 40/40/43/43 dBm 8/18/21/26AC FH	RRU0009
id-DAS-idRU-M-4008-4009-4018-4321-AC-F	ID-DAS idRU Master 40/40/40/43 dBm 8/9/18/21AC FH Clock Stability	RRU0020
id-DAS-idRU-M-4009-4018-4321-4326-AC-F	ID-DAS idRU Master 40/40/43/43 dBm 9/18/21/26AC FH	RRU0022
id-DAS-idRU-M-4008-4009-4318-4321-AC-F	ID-DAS idRU Master 40/40/43/43 dBm 8/9/18/21AC FH	RRU0036

8.1.2 EMEA/APAC Public Safety

8.1.2.1 EMEA/APAC PS MTDI

MTDI CHASSIS AND ELEMENTS	DESCRIPTION	ENG. NO.
id-DAS-MTDI-4-CH-SM-MM-48V DC	id-DAS MTDI 4 CH 1 SM & 1 MM SFP 48V DC	MTDI003
id-DAS-MTDI-4-CH-SM-MM-AC	id-DAS MTDI 4 CH 1 SM & 1 MM SFP AC	MTDI004
id-DAS-RFB-380-450	id-DAS RF board 380-450MHz	RA00374

8.1.2.2 EMEA/APAC PS MSDH

MSDH CHASSIS AND ELEMENTS	DESCRIPTION	ENG. NO.
id-DAS-MSDH-48V DC	id-DAS MSDH 48V DC feeding	MSDH005
id-DAS-MSDH-AC	id-DAS MSDH AC feeding	MSDH006

8.1.2.3 EMEA/APAC PS idRU

EMEA/APAC PUBLIC SAFETY IDRUS	DESCRIPTION	ENG. NO.
id-DAS-idRU-3604A-DC	ID-DAS idRU 3604 380-385UL,390-395DL48V DC	RRU0037
id-DAS-idRU-3604A-AC	ID-DAS idRU 3604 380-385UL,390-395DL AC	RRU0035

8.2 Americas Ordering Information

8.2.1 Americas Cellular

8.2.1.1 Americas Cellular APOI P/N

APOI CHASSIS AND ELEMENTS	DESCRIPTION	ENG. NUMBER
APOI-CH-AC-CN	APOI chassis AC feed includes controller	POI0001
APOI-CH-48V DC-CN	APOI chassis 48 DC feed includes controller	POI0002
APOI-CH-AC-R-CN	APOI chassis AC feeding redundant PS includes controller	POI0003
APOI-CH-48V DC-R-CN	APOI chassis 48 V DC feeding redundant PS includes controller	POI0004
APOI-BTSI-700LTE	APOI BTS int 700LTE Low/UP band	OT00086
APOI-BTSI-700LTE-UP	APOI BTS int 700LTE Upper band	OT00101
APOI-BTSI-700LTE-LOW	APOI BTS int 700LTE Lower band	OT00102
APOI-BTSI-800/850	APOI BTS int SMR800(7M) / 850 MHz	OT00087
APOI-BTSI-1700	APOI BTS interface 1700MHz	OT00088
APOI-BTSI-1900	APOI BTS interface 1900MHz	OT00089
APOI-BTSI-1700-13	APOI BTS interface 1700MHz AWS1+3	RA00463
APOI-T864-MDM	APOI CCD (Control module), includes Telit 864 WCDMA modem	OT00077
APOI-SW-DISP	APOI switch and Display card	OT00090
APOI-BLNK-PNL	APOI blank panel	MA00094
APOI-QMA-JUMPER-70CM	APOI QMA-QMA jumper 70 cm	1579100299

8.2.1.2 Americas Cellular MTDI P/N

MTDI MARKETING P/NS	DESCRIPTION	ENG. NO.
id-DAS-MTDI-4-CH-SM-MM-48V DC	id-DAS MTDI 4 CH 1 SM & 1 MM SFP 48V DC	MTDI003
id-DAS-MTDI-4-CH-SM-MM-AC	id-DAS MTDI 4 CH 1 SM & 1 MM SFP AC	MTDI004
id-DAS-RFB-700LTE	id-DAS RF board 700LTE	RA00179
id-DAS-RFB-800/850	id-DAS RF board SMR800(7M)/ 850 MHz	RA00173
id-DAS-RFB-1700	id-DAS RF board 1700MHz	RA00174
id-DAS-RFB-1700-13	id-DAS RF board 1700MHz AWS1+3	RA00406
id-DAS-RFB-1900	id-DAS RF board 1900MHz	RA00175

8.2.1.3 Americas Cellular MSDH P/N

MSDH MARKETING P/NS	DESCRIPTION	ENG. NO.
id-DAS-MSDH-48V DC	id-DAS MSDH 48V DC feeding	MSDH005
id-DAS-MSDH-AC	id-DAS MSDH AC feeding	MSDH006

8.2.1.4 Americas Cellular idRU P/N

AMERICAS IDRUS MARKETING P/NS	DESCRIPTION	ENG. NO.
id-DAS-idRU-M-3007-3008-3017-3019-AC	ID-DAS idRU Master 7/8/17/19 30dBm AC	RRU0003
id-DAS-idRU-M-3007-3008-3017-3019-DC	ID-DAS idRU Master 7/8/17/19 30dBm DC	RRU0008
id-DAS-idRU-M-4307-4308-4317-4319-AC-F	ID-DAS idRU Master 7/8/17/19 43dBm AC with fan hood	RRU0019

8.2.2 Americas Public Safety Ordering Information

8.2.2.1 Americas PS MSDH P/N

MSDH MARKETING P/NS	DESCRIPTION	ENG. NO.
id-DAS-MSDH-48VDC-NFPA	id-DAS MSDH 48VDC OCOX feed W.NFPA alarm	MSDH010
id-DAS-MSDH-AC	id-DAS MSDH AC feeding	MSDH006

8.2.2.2 Americas Public Safety MTDI P/N

MTDI MARKETING P/NS	DESCRIPTION	ENG. NO.
id-DAS-MTDI-4-CH-SM-MM-48V DC	id-DAS MTDI 4 CH 1 SM & 1 MM SFP 48V DC	MTDI003
id-DAS-MTDI-4-CH-SM-MM-AC	id-DAS MTDI 4 CH 1 SM & 1 MM SFP AC	MTDI004
id-DAS-RFB-700-PS	id-DAS MTDI RF board 700MHz PS	RA00393
id-DAS-RFB-800-PS	id-DAS MTDI RF board 800MHz PS	RA00391
id-DAS-RFB-420-425-PS	id-DAS MTDI RF board DL 420-425MHz, UL425-430M, PS	RA00507

8.2.2.3 Americas Public Safety idRU P/N

IDRUS MARKETING P/NS	DESCRIPTION	ENG. NO.
id-DAS-idRU-3707-3708-PS-NFPA-AC	ID-DAS idRU SMR 700/800 37dBm NFPA AC PWR	RRU0042
id-DAS-idRU-3707-3708-PS-NFPA-DC	ID-DAS idRU SMR 700/800 37dBm NFPA 48V DC PWR	RRU0027
id-DAS-idRU-3604-PS-NFPA-AC	ID-DAS idRU SMR 3604 NFPA AC PWR	RRU0043

8.3 Bespoke Ordering Information

APOI CUSTOMIZED PS	DESCRIPTION	ENG. NUMBER
APOI-CH-12V DC-CN	APOI chassis 12V DC feed, including CCD	POI0017
MTDI CUSTOMIZED PS	**DESCRIPTION**	**ENG. NO.**
id-DAS-MTDI-4-CH-SM-MM-12V DC	id-DAS MTDI 4 CH SM & MM SFP 12V DC	MTDI070
id-DAS-RFB-380-450	id-DAS RF board for 380-450MHz	RA00374
id-DAS-RFB-450-P25	id-DAS RF board for UHF 450MHz P25	RA00453
MSDH CUSTOMIZED PS	**DESCRIPTION**	**ENG. NUMBER**
id-DAS-MSDH-12V DC	id-DAS MSDH 12V DC feeding	MSDH008
IDRU CUSTOMIZED PS	**DESCRIPTION**	**PART NUMBER**
id-DAS-idRU-3604B-3604G-4008-4026-PS-AC-F	id-DAS-idRU-3604B-3604G-4008-4026-PS-AC-F	RRU0030
id-DAS-idRU-3004B-3004G-3008-3026-PS-AC	id-DAS-idRU-3004B-3004G-3008-3026-PS-AC	RRU0034

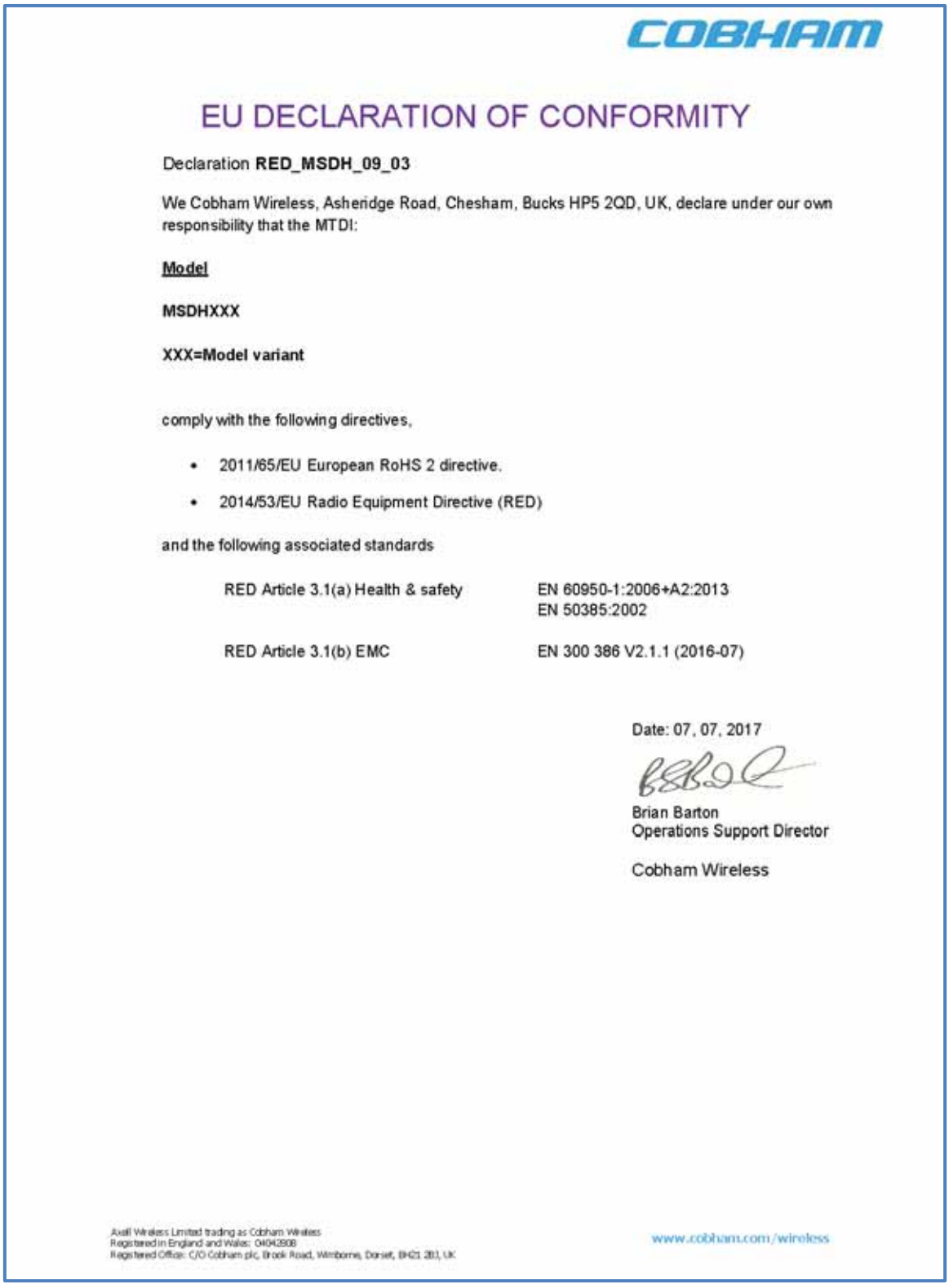
8.4 SFPs and Jumpers

The SFPs and jumpers are common to all regions.

SFPS MARKETING P/NS	DESCRIPTION	ENG. NO.
id-DAS-SFP-MM-10G-850NM-400M	id-DAS SFP MM 850NM 10G 400m 2 F/O	1577900047
id-DAS-SFP-SM-10G-1310NM-10KM	id-DAS SFP SM 1310NM 10G 10 km 2 F/O	1577900048
id-DAS-SFP-SM-10G-1271NM-10KM-WDM	id-DAS SFP SM 1271NM 10G 10 km WDM	1577900028
id-DAS-SFP-SM-10G-1331NM-10KM-WDM	id-DAS SFP SM 1331 NM 10G 10 km WDM	1577900029
id-DAS-SFP-SM-10G-1550NM-40KM	id-DAS SFP SM 1550nm 40 km 10Gb LC	1577900119
id-DAS-SFP-SM-10G-CH25-80KM	id-DAS SFP SM 10G 80 km 2 F/O CH25	1577900085
JUMPERS MARKETING P/NS	**DESCRIPTION**	**ENG. NO.**
id-DAS-MM-JUMPER-2WIRE- 3M	id-DAS MM jumper 3m 2 F/O	1577900058
id-DAS-SM-JUMPER-2WIRE- 3M	id-DAS SM jumper 3m 2 F/O	1577900049
id-DAS-SM-JUMPER-WDM- 3M	id-DAS SM jumper 3m WDM	1577900055

Appendix A – EU Declaration of Conformity

This section provides the EU Declaration of Conformity for idRU, MSDH, and MTDI.



COBHAM

EU DECLARATION OF CONFORMITY

Declaration **RED_MSDH_09_03**

We Cobham Wireless, Asheridge Road, Chesham, Bucks HP5 2QD, UK, declare under our own responsibility that the MTDI:

Model

MSDHXXX

XXX=Model variant

comply with the following directives,

- 2011/65/EU European RoHS 2 directive.
- 2014/53/EU Radio Equipment Directive (RED)

and the following associated standards

RED Article 3.1(a) Health & safety	EN 60950-1:2006+A2:2013 EN 50385:2002
RED Article 3.1(b) EMC	EN 300 386 V2.1.1 (2016-07)

Date: 07, 07, 2017

Brian Barton
Operations Support Director

Cobham Wireless

Axell Wireless Limited trading as Cobham Wireless
Registered in England and Wales: 04042808
Registered Office: C/O Cobham plc, Brook Road, Wimborne, Dorset, BH21 2BJ, UK

www.cobham.com/wireless

COBHAM

EU DECLARATION OF CONFORMITY

Declaration **RED_MTDI_09_02**

We Cobham Wireless, Asheridge Road, Chesham, Bucks HP5 2QD, UK, declare under our own responsibility that the MTDI:

Model

MTDI-XX-XX-XX-XX-XX

XX=Frequency bands fitted

comply with the following directives,

- 2011/65/EU European RoHS 2 directive.
- 2014/53/EU Radio Equipment Directive (RED)

and the following associated standards

RED Article 3.1(a) Health & safety	EN 60950-1:2006+A2:2013 EN 50385:2002
RED Article 3.1(b) EMC	EN 300 386 V2.1.1 (2016-07)

Date: 07, 07, 2017

Brian Barton
Operations Support Director

Cobham Wireless

COBHAM

EU DECLARATION OF CONFORMITY

Declaration **RED_RRU_09_01**

We Cobham Wireless, Asheridge Road, Chesham, Bucks HP5 2QD, UK, declare under our own responsibility that the RRU series of repeaters incorporating one or more cellular band and the specified downlink output power per band:

Model	
Single Band (XX=Power)	**Dual Band RRU-XXYY-XXYY (XX=Power, YY=Frequency)**
RRU-XX08	**Tri Band RRU-XXYY-XXYY-XXYY**
RRU-XX09	**(XX=Power, YY= Frequency)**
RRU-XX18	
RRU-XX21	**Quad Band RRU-XXYY-XXYY-XXYY-XXYY**
RRU-XX26	**(XX=Power, YY= Frequency)**

comply with the following directives,

- 2011/65/EU European RoHS 2 directive.
- 2014/53/EU Radio Equipment Directive (RED)

and the following associated standards

RED Article 3.1(a) Health & safety	EN 60950-1:2006+A2:2013 EN 50385:2002
RED Article 3.1(b) EMC	EN 301 489-1 V2.2.0 EN 301 489-5 V2.2.0 EN 301 489-50 V2.2.0
RED Article 3.2 Radio (where relevant to the wireless standards supported by the repeater)	EN 303 609 V12.5.1 EN 301 908-1 V11.1.1 EN 301 908-11 V11.1.2 EN 301 908-15 V11.1.2

Date: 07, 07, 2017

Brian Barton
Operations Support Director

Cobham Wireless

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