



# User manual

CFL Sprint MXM 5.8 Repeater radio unit

VER 1.1c

FW 3.6.6

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SAF RADIO UNIT does not contain serviceable parts. Warranty will not be applicable in the event SAF RADIO UNIT has been hermetically unsealed.



SAF Tehnika, JSC is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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 radio or television 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 receiving 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.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Industry Canada licence-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.

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.

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# Chapter 1: OVERVIEW

This manual refers to CFL Sprint MXM 5.8 Repeater radio units with following product codes:

- I06E1218L and I06E1218H
- I06M1218L and I06M1218H
- I06S1218L and I06S1218H
- I06E2118L and I06E2118H
- I06M2118L and I06M2118H
- I06S2118L and I06S2118H

# Labelling

The label contains the following information (see samples in the picture below):

**Product model name** ("CFL-06 Sprint MXM"). The Repeater radio unit model name example is:

- CFL-06 Sprint MXM for 5.8GHz Repeater radio unit,

**Product Number / Model Number (P/N or M/N)** (I06E1218H): product/model number contains various information about the unit. Please see translation below. **Serial Number** (348650100197): the serial number uniquely identifies the unit.



### P/N or M/N translation:

"I" designates series of the product;

"06" designates frequency band (5.8 GHz) of the radio;

### "E" designates electrical Ethernet management port type;

- "S" optical Single-mode Ethernet management port type;
- "M" optical Multi-mode Ethernet management port type
- "21" is IF frequency designator;
- "18" designates the version number of the radio;
- "H" designates high side radio;
- "L" low side radio

# Microwave Radiation

In April 1998, ICNIRP (International Commission on Non-Ionizing Radiation Protection) published its 'Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300GHz)'. As shown in Table below, the guidelines specify the 'Reference levels on power density for occupational exposure and general public exposure to time-varying electric and magnetic fields (unperturbed rms values)' between 2 and 300 GHz.



y regulations regarding output power and point-to-point installation and operation.

Quite a few other documents specify or refer to exposure limits comparable to those given above, e.g.:

- 1999/519/EC: Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic

fields (0 Hz to 300 GHz)

- WHO: Environmental Health Criteria 137: 'Electromagnetic Fields (300 Hz to 300 GHz)'

- ANSI/IEEE C95.1, 1999:

 ${\rm \tilde{IEEE}}$  Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz  ${\rm \tilde{GHz}}$ 

- BRD, Bundesimmissionsschutzgesetz, 26. BlmSchV Verordnung über elektromagnetische Felder

- Bundesamt für Umwelt, Wald und Landwirtschaft (BUWAL), Bern/Schweiz Schriftenreihe Umwelt Nr. 164, Luft, Mai 1992

'Messung nichtionisierender elektromagnetischer Strahlung, 1. Teil: Frequenzbereich 100 kHz bis 300 GHz'

- DIN VDE 0848-2, Entwurf, Oktober 1991:

Sicherheit in elektrischen, magnetischen und elektromagnetischen Feldern, Teil 2: Schutz von Personen im Frequenzbereich von

30 kHz bis 300 GHz

- ENV 50166-2, January 1995 (withdrawed in December 1999 by CENELEC)

'Human Exposure to Electromagnetic Fields (10 kHz - 300 GHz)'

# Interfaces

MXM Repeater has following interfaces:



### **1 & 5** N-type female connector

N-type female 50  $\Omega$  Intermediate Frequency (IF) ports. Any type of 50  $\Omega$  cable of good quality can be used; the cable should be equipped with N-type male connectors on each end. Commonly employing LMR400 type coaxial cable its length may reach 38 m. LCF12-50J cable also can be used, its length may reach 70 m.



MXM Repeater radio unit IF cable

### **2** BNC port

BNC connector provides received signal strength indication (RSSI) (voltage) to assist unit alignment.

RSSI port is used to adjust the alignment of antenna for best performance (for both rough and fine adjustment); this can be done using digital multimeter which is connected to the RSSI port. The output of the RSSI port is DC voltage and varies depending on received signal level.

The following chart and table shows typical relationship of the received signal level (Rx level) displayed by MXM Repeater vs. RSSI port output voltage (RSSI – Received Signal Strength Indicator). The RSSI port is located on MXM Repeater radio unit. The evaluated Rx level has the error +/-2 dB.



### 3 Twin-BNC port

Twin BNC connector provide terminal access (command line interface) to the unit which is the available management facility for MXM Repeater radio unit

Twin BNC connector is used for RS-232 serial port. RS-232 – USB convector cable can be used. Pinouts are shown in picture below.



### **4** DC power connector

2-pin DC connector for -48V power supply connection. Polarity layout does not matter. Both polarity (+/-) layout supported. Input DC voltage operating range -40.5V to -57V. DC power connector can be connected in any preferable layout.



### **5** N-type female connector

N-type female 50  $\Omega$  Intermediate Frequency (IF) port to connect with partner MXM Repeater.

### 6 Ethernet management port

Ethernet management 1Gbps port is intended for access of MXM Repeater management, web GUI. Upon customer request this port can be equipped with following interfaces:



Optical Ethernet interface ODC

Electrical Ethernet interface RJ-45

Optical ODC interface can be equipped with Single Mode (SM) optical fibre or Multi Mode (MM) optical fibre. ODC-LC fibre optics cable (different sizes) for interconnection of MXM Repeater with the user equipment can be provided upon request, as shown in example:



3m ODC-LC SM cable P/N I0AC0001

Electrical outdoor Ethernet interface RJ-45 weatherproof assembly parts of the cable connector are included in MXM Repeater package.

# Chapter 2: INSTALLATION

# Attaching MXM Repeater radio unit to antenna

In order to attach MXM Repeater to antenna, a separate ODU mounting bracket (P/N S0SPKS03) and flexible coaxial cable is required

For instructions how to connect MXM Repeater to mounting bracket refer to "SAF mounting bracket installation V1.0" document

# Powering MXM Repeater radio unit

MXM Repeater radio unit external power supply voltage must be between 40.5–57 V DC. 2-wire outdoor cable with dedicated 2-pin LTW DC connector assembly is needed to connect to MXM Repeater radio unit. Any polarity layout can be used. Preferable outer diameter of power cable is 6mm in order to match MXM Repeater radio unit side connector. Cross-sectional area shall be not less than 0.75 square mm (AWG 18) for installations up to 260 meters / 853 feet (35W load power). If this area is less than 0.75 square mm, the allowed maximum length of the cable is reduced due to a higher voltage drop.

Wire cross section	Lmax @ 50W	Lmax @ 35W	Lmax @ 25W
0.75mm <sup>2</sup>	180m / 590ft	260m / 853ft	380m / 1246ft
0.5mm <sup>2</sup>	120m / 393ft	180m / 590ft	250m / 820ft
0.25mm <sup>2</sup>	60m / 196ft	90m / 295ft	125m / 410ft

AWG	Lmax @ 50W	Lmax @ 35W	Lmax @ 25W
18	206m / 677ft	294m / 967ft	412m / 1353ft
20	129m / 426ft	185m / 608ft	259m / 851ft
24	51m / 168ft	73m / 240ft	102m / 337ft

Pre-soldered power supply connector with cable are available for purchase if needed: P/N IOACGE04 (0.3m) or P/N IOACGE05 (1.0m)



Power connector can be soldered in any polarity layout.



It is mandatory requirement to ground power supply and MXM Repeater radio units appropriately.

Table below helps choosing the most appropriate power adapter from SAF Tehnika accessories list for MXM Repeater radio units. Note that table summarizes maximum power consumption; normally consumption is 10-20% less. One should be aware of such aspects as power losses in the cable from AC/DC adapter to MXM Repeater radio unit and must be taken in to consideration.

Band (GHz)	Max power consumption (W)	Recommended PSU power (W)
5.8	<40	60

# 1 2 3 5 6 6 7

### Assembling of MXM Repeater DC connector is shown in following figures:

Assembling weatherproof DC power connector

- 1. You will need: (1-6) DC connector components and (7) ready 2-wire DC power cable.
- 2. Wider sealing rubber ring should be fitted inside from the front end of (6).

- 3. Narrower sealing rubber ring should be fitted inside from the rear end of (6).
- 4. Parts of the DC connector should be put on the cable in the sequence as shown
- 5. DC power cable should be soldered in any polarity layout.
- 6. Afterwards, part (6) should be tightened on to part (5).
- 7. Assembled DC power connector after tightening the last part (1)

# Chapter 3: WEB GUI

# Initial configuration

### System requirements

To access MXM Repeater radio unit Web GUI you will need a PC with the following system requirements:

Operating system

- Microsoft Windows XP / Vista / 7 / 8;
- Linux

Web browser

- Google Chrome;
- Mozilla Firefox;
- Internet Explorer 8 (or above)



### Ethernet management connection configuration

Before proceeding with initial link setup in Web GUI, you must adjust IPv4 settings of your LAN adapter to 192.168.205.0 subnet. IP address should be other than default low/high side IP addresses (192.168.205.10/192.168.205.11).

Internet Protocol Version 4 (TCP/IPv4)	Properties ? X
General	
You can get IP settings assigned auton this capability. Otherwise, you need to for the appropriate IP settings.	natically if your network supports ask your network administrator
Obtain an IP address automaticall	у
• Use the following IP address:	
IP address:	192 . 168 . 205 . 1
Subnet mask:	255.255.255.0
Default gateway:	· · ·
Obtain DNS server address autom	natically
• Use the following DNS server add	resses:
Preferred DNS server:	
Alternate DNS server:	· · ·
Validate settings upon exit	Ad <u>v</u> anced
	OK Cancel

After applying these settings you are ready to connect to Web GUI or establish SSH/Telnet connection. Refer to Chapter 4: COMMAND LINE INTERFACE for details how to connect to other CLI interfaces (serial, SSH, Telnet).

### Accessing MXM Repeater radio unit Web GUI

- 1. Launch your browser and in address field enter MXM Repeater radio unit IP address. Default IP addresses are as follows:
  - 192.168.205.10 for low side MXM Repeater radio unit (P/N I\*\*\*\*\*\*L\*)





For secure connection use https:// prefix.

- 2. Press "Enter" key.
- 3. Login screen will appear.
- 4. Enter username and password. Default credentials are as follows:
  - Username: admin
  - Password: changeme

	<b>SAF</b>
U	sername
Pa	assword
Re	emember password 🔲 Log in

- 5. Select "Remember password" if you want browser to remember entered login credentials.
- 6. Press "Log in" button.



"Switch to secure connection (HTTPS)" indicates that HTTP protocol is being used. Press on the link and you will be redirected to secure HTTPS URL.

### Main page

After login you will be automatically redirected to the Main page of Web GUI:

Sprint MXM Repeater	Nome SAF		19 address 192.168.205.10	Serial number 344490100088	Uptime Od 03:19:59	3.6.5	admin 1
<b>SA</b> F	<b>đ</b> Main	() Networking	<b>III</b> Performance	<b>System</b>	2		
Main						0	MODIFY 4
Radio	3	Local					
Tx power		25 dBm				B,	LAVE
Tx mute		Disabled				10	00000
Tx frequency		5740 MHz					
Rx frequency		5835 MHz					
Rx level		-39 dBm				5	System summary
CW mode		Disabled					Rx level
Bandwidth		30 MHz				20.40	5
Modulation max		32 QAM				-39.08	m
System		Local					Tx power
PSU input voltage		44.90 V				25 dBr	E
PSU consumed power		37.50 W					Tx frequency
Radio temperature		55.0 C				57401	1Hz
							Edit

Web GUI is divided into 5 sections:

### **1** Top panel

Shows information about MXM Repeater radio unit you are connected to including:

- Model name
- System name
- IP address
- Serial number
- Uptime
- Firmware version
- User name

### **2** Menu panel

Allows navigating between Main page ("Main") and subpages of 2 sections:

- Performance
- System

### 3 Main Web GUI window

By default Main page ("Main") is shown. Contents will change according to menu panel selection.

### 4 MODIFY / SAVE / LOGOUT

Allows modifying parameters in the main window. If none can be modified, MODIFY button appears inactive. After modification SAVE button becomes active and indicates number of unsaved changes as well as their type (when moving cursor over the button).

### 5 System summary

Shows three selected parameters of local system.



Values appear in red colour in case of exceeding <u>alarm threshold values</u> or in case of a warning.

Values appear in orange colour in case <u>alarm threshold values</u> were exceeded during last 15 seconds.

### Modifying basic system parameters

In order to proceed with initial configuration, press MODIFY button and entry fields will appear for adjustable values:

Sprint MXM Repeater	Name SAF		IP address 192.168.205.10	Serial number 299060300020	Uptime Od 04:29:2	1 3	irmware versi 1.6.6	on User name admin
<b>SAF</b>	<b>Main</b>	(Metworking	<b>III</b> Performance	<b>Ö</b> System				
Main								MODIFY
Radio		Local						
Tx power ( 8 25 dBm for 32	QAM )	25	1 dBm					B SAVE 9
Tx mute		Off 🔻	2					- LOGOUT
Tx frequency ( 5740 )		5740.00	3 MHz					
Rx frequency ( 5835 )		5835.00	4 MHz					System summary
Rx level		<-84 dBm	1					,
CW mode		Off 🔻	5					Rx level
Bandwidth		30 WHZ			6		25 • 5	Tx power dBm Tx frequency 740 MHz
Modulation max		4QAM 16QAM 32QAM 64QAM 128QAM			7		*	Edit
System		Local						
PSU input voltage		46.43 V						
PSU consumed power		34.25 W						
Radio temperature		55.0 C			8 [	Execute configu	ration	

### **1** Tx power

Available range depends on radio model and selected modulation. Actual range will be indicated in the brackets.

### **2** Tx mute

- Auto option is default. This mode mutes RF Tx in case of no incoming signal
- Off option disables RF Tx mute functionality
- On option allows muting RF transmitter to limited time interval in seconds. This option is not saved in configuration file. After timeout RF Tx returns to previously saved mode *Auto* or *Off.*

### **3** Tx frequency

Allows configuring transmitting frequency. Available frequency range depends on frequency band, subband, radio side and channel bandwidth selected. Actual range will be indicated in the brackets.

### **4** Rx frequency

Allows configuring receiving frequency. Available frequency range depends on frequency band, subband, radio side and channel bandwidth selected. Actual range will be indicated in the brackets.

### **5** CW mode

Allows to enable diagnostics and antenna alignment mode.

- *RF Tx* option provides set Tx RF output power even if the partner repeater unit is not connected and there is no RF Rx level.
- Off option disables CW mode functionality

### 6 Bandwidth

Allows configuring channel bandwidth of the received/transmitted RF signal.

### 7 Modulation max

Allows choosing between available modulations for selected channel bandwidth. When changing modulation, max Tx power range is changed accordingly to chosen modulation.

### 8 Execute

By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater radio unit.

### **9** Save

By pressing "Save" changes applied to the corresponding section are saved in configuration file.

# Networking

### Networking $\rightarrow$ Port status and configuration

Shows status of Ethernet management port, allows modifying link speed/duplex.

<b>SAF</b>	<b>d</b> Main	Metworking	Performance	<b>\$</b> System	
Networking / Po	ort Ethernet				
State	Port status an	d configuration			
Status mode					
	đ		ы	¢	
<b>SAF</b>	Main	Networking	Performance	System	
<b>SAF</b> Networking / P	Main ort status and	Networking	<b>III</b> Performance	<b>Ö</b> System	
SAF Networking / P	Main Ort status and	Metworking d configuration NG (RJ-45)	Performance n	<b>Ö</b> system	
State	Main Ort status and M Ei	Networking d configuration NG (RJ-45) nabled	n Performance	<b>Ö</b> System	
State Link status	Main Main Ort status and Ei Ei 10	Metworking d configuration NG (RJ-45) nabled 000 Mbps	Performance n 2	<b>Ö</b> system	



Modify mode

SAF Networking / Po	Main Dort status and d	Networking	Performance	System (		
	MNC	6 (RJ-45)				
State	Enal	oled	1			
Link status	1000	Mbps	2			
Link speed	Aut	• •	3			
				4	Rollback on 🗐	Execute configuration

- 1) State Indicates operation status of Ethernet management port;
- Link status Indicates whether link with Ethernet management port is established and its link speed;
- Link speed Indicates whether link speed is configured to automatic speed setting or manual (status mode); allows changing link speed to manual setting (modify mode);
- 4) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater radio unit. If *"Rollback on"* is selected, configuration will be reverted in case erroneous configuration changes are applied.

CLI commands (<u>System → Tools → Console</u>)

Network port set mng speed	Use to change speed and duplex setting on Ethernet
<auto 100fdx 100hdx></auto 100fdx 100hdx>	management port. Default value is "auto" (autonegotiation).

# Performance

### Performance $\rightarrow$ Alarm $\rightarrow$ Alarm status

*Alarm status* page summarizes current alarms by showing date and time the alarm occurred and its name.

<b>šA</b> F	<b>d</b> Main	(Hetworking)	Performance	<b>System</b>	
Main	Alarm			Ethernet	-
Radio	Alarm status			Ethernet statistics	
Tx power	Alarm event lo	g			
Tx mute	Sensor configu	uration			
Tx frequency	Alarm thresho	ld configuration			
Rx frequency	Monitoring				
Rx level	Performance o	Iraph			
CW mode	Performance l	pq			
Rx IF cable attenuation		~			
1	1	DEDE NUL	7.5		

<b>SAF</b> Performa	nce / A	Main status	Netw		Performance	<b>Ö</b> System
Date	1	Time	2	Alarm	3	
2017-02-21		14:09:16		Rx mute	status [Mute(On)]	[0x00000001]
2017-02-21		14:09:16		Rx level	[-84 dBm]	

- 5) Date shows date when alarm was initiated;
- 6) Time shows time when alarm was initiated;
- 7) Alarm shows name of the alarm.

### CLI commands (<u>System → Tools → Console</u>)

sensor setlist	Use to show alarm status.	
----------------	---------------------------	--

### Performance $\rightarrow$ Alarm $\rightarrow$ Alarm event log

Alarm log shows 20 alarm entries per page and about 2000 alarm entries in total. Full alarm log can be downloaded by pressing on "Alarm event log file". Last page of log entries is shown by default.

Alarm entries are mostly distributed in two groups – "Set" when alarm appears and "Reset" when alarm disappears.

There is alarm filtering option available, where it is possible to choose which alarm groups user is willing to filter out of all log entries.

<b>šA</b> F	<b>1</b> Main	() Networking	Performance	System	
Performance / Ala	Alarm			Ethernet	
Date	Alarm status			Ethernet statistics	
2017-02-21 2017-02-21 2017-02-21	Alarm event Sensor config Alarm thresh Monitoring Performance Performance	og guration old configuration graph log			
					4

### Status mode

Perf	ormance / Alarm ev	ent log					
				Toggle period selection	Load the	alatest data	
No.	Date and Time	Source	Status	Event			
778 779 780 781 782 783 783 784	2016-01-27 15:12:11 2016-01-27 15:12:13 2016-01-27 15:12:13 2016-01-27 15:12:13 2016-01-27 15:12:13 2016-01-27 15:12:16 2016-01-27 15:12:17	evlog unknown-rpc config config config unknown-rpc Radio	RESET	System started (bank: fw1 / fw: 3.1.6) setting license signal (#3E1B582F:-444) Boot status is 0x00400000 Last reset was due to POR (power on reset) Watchdog timeout is 60 seconds setting license signal (#3E1B582F:-444) Mute status [Mute(Off)] [0x00000000]			
785 786 787 788 788 789	2016-01-27 15:12:18 2016-01-27 15:12:18 2016-01-27 15:12:20 2016-01-27 15:12:20 2016-01-27 15:12:20	Radio i2c unknown config Radio	SET RESET RESET	Mute status [Mute(On)] [0x00000001] Invalid secure chip [Chip(Ok)] [0x00000000] Enable copper (#12B58274:0) Cfg without changes from 'cold-boot' Mute status [Mute(Off)] [0x00000000]			
790 791 792 793 794	2016-01-27 15:12:20 2016-01-27 15:12:37 2016-01-27 15:15:17 2016-01-27 15:18:42 2016-01-27 15:24:31	Radio Radio login login configd[rpc]	SET RESET	Mute status [Mute(On)] [0x00000001] Mute status [Mute(Off)] [0x00000000] admin login success [WEB] [192.168.205.9] admin login success [WEB] [192.168.205.18] Cfg without changes from 'config.list'			
<<	Previous 20 Next 20	>>					
Selec	t page (1 - 40 ) 40 Sele	ect			Filter:	No filter	۲
Alarm	event log file						

Press 🥟 MODIFY button.

### Modify mode

Perf	ormance / Alarm eve	ent log			
Clea	ar alarm event log ] ]			2 Toggle period selection 3	Load the latest data
No.	Date and Time	Source	Status	Event	
778 779 780 781 782 783 784 785 786 787 788 787 788 789 790 791 792 793 794 <<<	2016-01-27         15:12:11           2016-01-27         15:12:13           2016-01-27         15:12:13           2016-01-27         15:12:13           2016-01-27         15:12:13           2016-01-27         15:12:13           2016-01-27         15:12:13           2016-01-27         15:12:16           2016-01-27         15:12:17           2016-01-27         15:12:18           2016-01-27         15:12:20           2016-01-27         15:12:20           2016-01-27         15:12:20           2016-01-27         15:12:20           2016-01-27         15:12:20           2016-01-27         15:12:20           2016-01-27         15:12:20           2016-01-27         15:12:20           2016-01-27         15:12:20           2016-01-27         15:12:37           2016-01-27         15:12:37           2016-01-27         15:12:431           Previous 20         Next 20	evlog unknown-rpc config config unknown-rpc Radio Radio i2c unknown config Radio Radio Radio Radio Iogin login configd[rpc]	4 RESET SET RESET RESET SET RESET	System started (bank: fw1 / fw: 3.1.6) setting license signal (#3E1B582F:-444) Boot status is 0x00400000 Last reset was due to POR (power on reset) Watchdog timeout is 60 seconds setting license signal (#3E1B582F:-444) Mute status [Mute(Off)] [0x00000000] Invalid secure chip [Chip(Ok)] [0x00000000] Enable copper (#12B58274:0) Cfg without changes from 'cold-boot' Mute status [Mute(Off)] [0x0000000] Mute status [Mute(Off)] [0x0000000] admin login success [WEB] [192.168.205.9] admin login success [WEB] [192.168.205.18] Cfg without changes from 'config.list'	
Selec Alarm	t page (1 - 40) 40 Sele	<u>et</u> ]6			7Filter: No filter 🔹

- 1) Clear alarm log deletes all alarm log entries;
- 2) Toggle period selection opens period selection controls;
- 3) Load the latest data refreshes alarm log and shows last 20 log entries;
- 4) List of alarm log entries entry number, date and time, source node, status and event name;
- 5) Navigation controls. "<<" navigates to start of alarm log, while ">>" to the end; "Previous 20" navigates to previous alarm log page showing 20 previous alarm log entries, while "Next 20" – to next alarm log page showing 20 next alarm log entries (if available).
- 6) Shows number of currently viewed alarm log page. In Web GUI only last 20 pages (400 entries) are shown. Download alarm log to view full list;

- 7) Filter press to filter alarms from certain source node (e.g. Radio);
- 8) Alarm event log file press on the link to download full alarm log text file.

### CLI commands (<u>System → Tools → Console</u>)

log event show last <#_of_entries>	Use to show certain number of last alarm log entries.
log event show time <time></time>	Use to show entries from a certain time point. Following formats are supported: YYYY-MM-DD/hh:mm:ss; MM- DD/hh:mm:ss; MM-DD/hh:mm; hh:mm:ss; hh:mm
log event show sensor <sensor> <last time> &lt;#_of_entries time&gt;</last time></sensor>	Use to show entries for a specific sensor. Regarding subcommands "last" and "time" refer to commands above.
log event show module <modem ns psu radio system> <last time> &lt;#_of_entries time&gt;</last time></modem ns psu radio system>	Use to show entries for a specific module. Regarding subcommands "last" and "time" refer to commands above.
log event clear	Use to clear alarm log

### Performance $\rightarrow$ Alarm $\rightarrow$ Sensor configuration

Following section allows specifying behaviour of available sensor parameters.



### Status mode

			Group data	a destination	ns	Ungrouped sensor list (6)	
Group	State	log event	log perf	log somo		Rx level	•
(name)	orace	log_event	iog_pen	iog_aninp	log_syslog	1.8 V	~
+ Alarm log	Enabled	~	×	×	×	1.5 V	J
(alarm_only)				-		1.0 V	
+ PM log only (log_only)	Enabled	×	~	×	×	License expired	
Full						License remaining time	~
+ monitoring (default_all)	Enabled	~	-	-	×		

Press 🦉 MODIFY button.

### Modify mode

			Group data	a destination	ns	Ungrouped sensor list (6) 2	
Group			law and	1	les andes	Rx level	e
(name)	State Ing	log_event	log_perf	log_snmp	log_syslog	1.8 V	۲
+ Alarm log						1.5 V	
(alarm_only)	C)	۷				1.0 V	
+ PM log only (log_only)						License expired	۲
Full	-	-	-			License remaining time	۲
monitoring (default_all)				۲			

- 1) **Group description (name)** Shows 3 groups of sensors divided by different group data destinations (event; perf; snmp), as well as indicates whether group is enabled (state);
- Ungrouped sensor list Shows list of sensors not added to any of existing groups (status mode); allows dragging to any of existing groups, thus specifying how the sensor will be treated. Unchecking checkbox next to the sensor disables the sensor (modify mode).
- 3) *Add group* Allows creating a new group with custom name and description.

_	- 8
Group name (<33 characters):	
Allowed: A-Z;a-z;0-9;-;_	
Group description (<129 characters):	- 1
Add group	_
	_

Afterwards sensors from ungrouped sensor list or other groups can be added to the group by dragging in.

4) Remove group – Allows deleting existing groups via a dialog window.



- 5) Set all to default Restores default settings for all groups and sensors.
- 6) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater radio unit.

CLI commands (<u>System → Tools → Console</u>)

log group info	Use to show sensor group configuration.
log group create <name> <description></description></name>	Use to create a new group.

log group mgmt <name> add destination <event perf snmp></event perf snmp></name>	Use to add a destination for a group.
log group mgmt <name> add sensor <sensor></sensor></name>	Use to add a sensor to a group.
log group mgmt <name> config <enable disable></enable disable></name>	Use to enable or disable a group.
log group mgmt <name> delete</name>	Use to delete a group.
log group mgmt <name> remove destination <event perf snmp></event perf snmp></name>	Use to remove a destination from a group.
log group mgmt <name> remove sensor <sensor></sensor></name>	Use to remove a sensor from a group.
log sensor list	Use to list all available sensors.

# Performance $\rightarrow$ Alarm $\rightarrow$ Alarm threshold configuration

Page provides summary of parameters' alarm thresholds. All thresholds are predefined and some change dynamically according to system configuration. Thresholds can be modified if required.

Alarm activates when current value exceeds low-delta or high+delta values. Alarm deactivates when current value exceeds low+delta or high-delta values.



### Status mdoe

Performance / Alarm	threshold configu	uration			
Alarm name	Low value	High value	Delta value	Current value	
Rx level	-70 dBm	-35 dBm	2 dB	-47 dBm	
PSU current	0.200 A	1.100 A	0.000 A	0.800 A	
PSU voltage	36.00 V 1	58.00 V	2.00 V	46.50 V	
PSU power	12.00 W	40.00 W	2.00 W	37.20 W	
1.8 V	1.71 V	1.89 V	0.02 V	1.78 V	
1.5 V	1.13 V	1.89 V	0.02 V	1.47 V	
1.0 V	0.97 V	1.03 V	0.02 V	0.99 V	
System free physical memory				94.1 %	
System CPU idle				98.4 %	
System temperature	-40.0 C	100.0 C	2.0 C	41.0 C	
System CPU temperature	-40.0 C	100.0 C	2.0 C	45.6 C	
License remaining time	15d 00:00:00			26d 21:00:15	
System uptime				0d 00:21:06	

Press 🦉 MODIFY button.

### Modify mode

S

Alarm name	Low value		High value		Delta value		Current value
Rx level	-70	dBm	-35	dBm	2	dB	-47 dBm
PSU current	0.200	A 1	1.100	A	0.000	A	0.800 A
PSU voltage	36.00	V	58.00	V	2.00	V	46.50 V
PSU power	12.00	w	40.00	w	2.00	w	37.20 W
1.8 V	1.71	V	1.89	v	0.02	V	1.78 V
1.5 V	1.13	V	1.89	V	0.02	V	1.49 V
1.0 V	0.97	v	1.03	V	0.02	V	0.99 V
System free physical memory	10 Hz		0.00		10.00		94.1 %

		_							
5 V	1.13	v	1.89	V	0.02	V	1.49 V		
0 V	0.97	v	1.03	V	0.02	V	0.99 V		
ystem free physical memory					0.255		94.1 %		
ystem CPU idle							99.4 %		
ystem temperature	-40.0	С	100.0	С	2.0	С	41.5 C		•
ystem CPU temperature	-40.0	с	100.0	С	2.0	С	45.8 C		
icense remaining time	15d 00:00:00	)					26d 20:59:3	5	
ystem uptime							0d 00:21:52		
Set all to default ] 2							4	Execute con	figuration

- Indicates low, high and delta values of the parameters (status mode); "Low value", "High value" and "Delta value" fields for all parameters become editable when "Default value" is deselected (modify mode);
- Set all to default resets "Low value", "High value" and "Delta value" for all parameters to factory defaults;
- 3) Default value deselect to activate manual threshold modification;
- 4) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater radio unit.

### CLI commands (<u>System → Tools → Console</u>)

log sensor info	Use to show configuration of sensor thresholds.
log sensor mgmt <sensor> control <auto user></auto user></sensor>	Use to set sensor thresholds to user defined or automatically adjusted.

log sensor mgmt <sensor> thold <min> <max> <delta></delta></max></min></sensor>	Use to set sensor's min, max thresholds and delta value manually.
<b>log sensor mgmt</b> <sensor> <b>time</b> &lt;030&gt;</sensor>	Use to set sensor hysteresis time in seconds. Will be used to show value in orange colour indicating that sensor value recently exceeded its thresholds.

# Performance $\rightarrow$ Monitoring $\rightarrow$ Performance graph

Performance graph allows visualising various parameters over chosen time period as curves. Available parameters will depend on <u>Sensor Configuration</u>. Any two parameters can be shown at a time. By default Rx level (dBm) and Radial MSE (dB) are selected.

Not al	l sensors	available in <u>S</u>	<u>ensor Config</u>	uration can be displayed in Performance graph.
<b>SAF</b>	<b>d</b> Main	() Networking	L.I Performance	<b>Ö</b> System
Performance / Ala	Alarm			Ethernet
Alarm name Rx level Rx IF cable attenuation PSU current	Alarm status Alarm event l Sensor config Alarm thresh Monitoring	og guration old configuration		Ethernet statistics
PSU power	Performance	graph		
Radio temperature	renormance	iog		

MODIFY button is deactivated in Performance graph page.



- 1) Left axis sensor Allows choosing sensor parameter coloured in red and displayed on left axis.
- 2) *Right axis sensor* Allows choosing sensor parameter coloured in blue and displayed on right axis.
- 3) Sensor log step Allows choosing graph granularity 1, 15 or 60 minutes.
- 4) Indicates start and end date/time of period displayed and allows selecting specific period to show.
- 5) *Period length* Indicates length of currently displayed period.
- 6) Get data Press to apply selected time interval changes.
- 7) Left and right sliders allow to "zoom" currently selected time period.

# Performance $\rightarrow$ Monitoring $\rightarrow$ Performance log

<b>šA</b> F	<b>M</b> ain	() Networking	Lul Performance	Sy	stem	
Performance / Pe	Alarm				Ethernet	
Select sensors	Alarm status				Ethernet statistics	
Left axis sensor Rx	Alarm event I	log				
Select time interval	Alarm thresh	guration old configuration				
Sensor log step	Monitoring	anta konstan a <sup>2</sup> ostantarian - A				
1 minute 🔻	Performance	graph				
Sensor graphs	Performance	log				
				1.65		

### MODIFY button is deactivated in Performance log page.

Select sensors       1         Select all       Deselect all         Rx level       Radio temperature       System temperature       System CPU temperature         System uptime       PSU voltage       PSU power       PLL status         System CPU idle       System free physical memory       Rx mute status       1.0 V         PSU current       1.8 V       1.5 V       Image: Select fields         Select fields       2       Select fields       No data (s)       Not available (s)         Select time interval       3       Sensor log step       From       To       Period length       Log entries per page:         15 minutes       2017-1-11115:54       2017-2-22.09:24       41d 17h 30m       50       Image: Sensor log step	Performan	ce / Perfor	mance log							
Select all       Deselect all         Rx level       Radio temperature       System temperature       System CPU temperature         System uptime       PSU voltage       PSU power       PLL status         System CPU idle       System free physical memory       Rx mute status       1.0 V         PSU current       1.8 V       1.5 V       1.0 V         License expired       License remaining time       1.5 V       V         Select fields       2       2       Select time interval       3         Sensor log step       From       To       Period length       Log entries per page:         15 minutes       2017-1-11 15:54       2017-2-22 09:24       41d 17h 30m       50	Select sensor	s <b>1</b>								
Rx level Radio temperature System temperature System CPU temperature   System uptime PSU voltage PSU power PLL status   System CPU idle System free physical memory Rx mute status 1.0 V   PSU current 1.8 V 1.5 V 1.0 V   License expired License remaining time Select fields 2   Select fields 2 Select time interval Sensor log step From To Period length Log entries per page: 15 minutes 2017-1-11 15:54 2017-2-22 09:24 41d 17h 30m 50	Select all	Deselect all	)							
Select fields       2         Select all       Deselect all         Minimum        Average        Maximum        Threshold seconds        No data (s)       Not available (s)         Select time interval       3         Sensor log step       From       To       Period length       Log entries per page:         15 minutes ▼       2017-1-11 15:54       2017-2-22 09:24       41d 17h 30m       50 ▼	Rx level System uptime System CPU id PSU current License expire	e i ille i d i	Radio temperatu PSU voltage System free phys 1.8 V License remainin	re ical memory g time		System temperature PSU power Rx mute status 1.5 V		System CPU PLL status 1.0 V	J temperature	
Sensor log step         From         To         Period length         Log entries per page:           15 minutes         2017-1-11 15:54         2017-2-22 09:24         41d 17h 30m         50	Select fields Select all Minimum @ Select time in	Z Deselect all Avera	) ge 🕑 Ma	ximum 🕑	Thresh	old seconds 🕑	No data (s)		Not available (s	;)
4 One page 5 Paged 6 Download XML	Sensor log stej	o From 2017-1	-11 15:54 👩	To 2017-2-22 (	09:24	Period length 41d 17h 30m	Log en per pag	tries je: 4 5 6	One page Paged Download X	) ) ML_)

- Select sensors Allows choosing sensor parameters to be displayed in performance log.
- 2) Select fields Allows choosing parameter fields to be displayed in performance log. "Minimum" and "Maximum" represent minimum and maximum values in specified sensor log step, while "Average" displays average value; "Threshold seconds" will show amount of seconds in chosen time interval when parameter exceeded minimum or maximum alarm thresholds; "No data (s)" and "Not available (s)" show respectively time when there was no data of according parameter and it was not available.
- 3) Select time interval Allows choosing graph granularity 1, 15 or 60 minutes.
- 4) One page Will display performance log on a single page in a separate tab.
- 5) Paged Will display performance log divided in pages in a separate tab.
- 6) **Download XML** Press to download performance log in an extensible markup language (.xml) file.

### CLI commands (<u>System → Tools → Console</u>)

log perf show	Use to show specified number of last performance log entries
<1M 15M 60M> last	with specified sensor log step.

<11440>	
<b>log perf show</b> <1M 15M 60M> <b>time</b> <time></time>	Use to show entries from a certain time point. Following formats are supported: YYYY-MM-DD/hh:mm:ss; MM- DD/hh:mm:ss; MM-DD/hh:mm; hh:mm:ss; hh:mm
log perf clear	Use to clear performance log.

## Performance $\rightarrow$ Ethernet $\rightarrow$ Ethernet statistics

### Shows Ethernet management port statistics

<b>SAF</b>	<b>M</b> ain	(Networking	La Performance	System	
Performance / Etł	Alarm			Ethernet	
Statistics for	Alarm status Alarm event l	og		Ethernet statistics	
Rx Bytes	Sensor confid	guration			
Rx compressed	Alarm thresh	old configuration			
Rx CRC errors	Monitoring				
Rx Dropped	monitoring	and the second se			
Rx Errors	Performance	graph			
Rx Frame errors	Performance	log			
By Length errors					

### Status mode

Performance / Ethernet statistics

		MNG
Statistics for	1	0d 19:31:12
Rx Bytes	2	5983989
Rx compressed	3	0
Rx CRC errors	4	0
Rx Dropped	5	451
Rx Errors	6	0
Rx Frame errors	7	0
Rx Length errors	8	0
Rx missed errors	9	0
Rx packets	10	26231
Tx Bytes	11	17750698
Tx compressed	12	0
Tx Dropped	13	0
Tx Errors	14	0
Tx fifo errors	15	0
Tx packets	16	27069

### Press 🦉 MODIFY button.

### Modify mode

Clear all data ] 17

18 Clear

- 1) Statistics for Time during which statistics have been gathered;
- 2) Rx Bytes Indicates the number of received bytes;
- 3) Rx compressed Indicates the number of received compressed packets;
- 4) Rx CRC errors Indicates the number of packets received with a CRC (FCS) error;
- Rx Dropped Indicates the number of received packets but which are dropped, those packets are not forwarded to the upper layers for packet processing;
- 6) Rx Errors Indicates the number of received errors;

- 7) **Rx Frame errors** Indicates the number of received frames with error, such as alignment errors;
- 8) **Rx Length errors -** Indicates the number of received error packets with a length error oversized or undersized;
- 9) **Rx missed errors** Indicates the number of received packets that have been missed due to lack of capacity in the receive side;
- 10) Rx packets Indicates the total number of good received packets;
- 11) Tx bytes Indicates the number of transmitted bytes;
- 12) Tx compressed Indicates the number of transmitted compressed packets;
- 13) Tx Dropped Indicates the number of packets dropped during transmission;
- 14) Tx Errors Indicates the number of packets in error during transmission;
- 15) Tx fifo errors Indicates the number of packets having caused a transmit FIFO error;
- 16) Tx packets Indicates the number of transmitted packets
- 17) Clear all data Clears statistics
- 18) Clear Clears statistics

# System

### System $\rightarrow$ FW $\rightarrow$ Firmware upgrade

<b>šA</b> F	Main Networking Performance	Ç System
System / Firmwar	FW	Tools
3.5.19	Firmware upgrade	Console
3.6.5	Configuration	About
5.0.0	IP configuration SNMP configuration Configuration file Password configuration System configuration System services Diagnostic	Copyright Inventory
	Download troubleshooting file	

### Status mode

System / Firmware upgrade

5.19	1	
3.6.5	•	
3.6.6		

Press 🦉 MODIFY button.

### Modify mode

System / Firm	nware upg	grade		
3.5.19 3.6.5 3.6.6				*
2	3	4		*
Upgrade firmwa	re] Reboot	Delete		
5			6	
Choose File	No file ch	nosen	File: Upload	

- 1) Shows list of available firmware files;
- 2) **Upgrade firmware** click on preferred firmware in the list and press "Upgrade firmware" button to initiate firmware upgrade process.
- 3) *Reboot* Reboots management CPU.
- 4) Delete Deletes selected firmware file from the list.
- 5) Choose File Press to browse for a firmware file on your hard disk drive.
- 6) **Upload** Press to upload a firmware file to MXM Repeater.

### CLI commands (<u>System → Tools → Console</u>)

firmware info [ <version>]</version>	Use to show detailed information on current or specific MXM Repeater firmware.
firmware install <version></version>	Use to install firmware version uploaded. Note that exact version needs to be entered. Check available firmware versions using command "firmware list".
firmware list	Use to list uploaded firmware versions.
firmware remove <version></version>	Use to remove firmware version uploaded. Note that exact version needs to be entered. Check available firmware versions using command "firmware list".
firmware remove.list	Use to remove all uploaded firmware versions.
firmware switch	Use to check running firmware bank and bank that will be used at the next boot.
firmware switch <fs fw1 fw2 toggle></fs fw1 fw2 toggle>	Use to define bank that will be used at the next boot. "fw1" and "fw2" subcommands set appropriate bank, "toggle" forces to set other bank than the running one, "fs" is factory defined emergency bank, which is used if both "fw1" and "fw2" fail.

### System $\rightarrow$ Configuration $\rightarrow$ IP configuration

IP address configuration page is available in "System" menu (System $\rightarrow$ Configuration $\rightarrow$ IP configuration).

<b>šA</b> F	A Main	() Networking	<b>III</b> Performance	System	
System / IP config	FW			Tools	
IP address	Firmware upg	rade		Console	
IP gateway	Configuration	1		About	
Ethernet MAC address	IP configurati	on		Copyright	
	Configuration	file		Inventory	
	Password cor	nie			
	System confir	nigaration			
	System comig	ces			
	Diagnostic				14
	Download tro	ubleshooting file			з

### Status mode

System / IP configurat	tion		
IP address	1	192.168.205.11	
IP mask	2	255.255.255.0	
IP gateway	3		
Ethernet MAC address	4	00:04:a6:81:39:f4	

Press 🦉 MODIFY button.

### Modify mode

System / IP configura	tion			
IP address	1	192.168.205.11		
IP mask	2	255.255.255.0		
IP gateway	3			
Ethernet MAC address	4	00:04:a6:81:39:f4		
			5	Execute configuration ]

- IP address Indicates IP address of MXM Repeater radio unit you are currently logged in (status mode); allows specifying IP address of MXM Repeater radio unit you are currently logged in (modify mode). Default IP address is 192.168.205.10.
- IP Mask Indicates IP mask of MXM Repeater radio unit you are currently logged in (status mode); allows specifying IP mask of MXM Repeater radio unit you are currently logged in (modify mode). Default IP mask is 255.255.255.0.
- IP gateway Indicates gateway address of MXM Repeater radio unit you are currently logged in (status mode); allows specifying gateway address of MXM Repeater radio unit you are currently logged in (modify mode). By default gateway is not specified (blank).
- Ethernet MAC address shows the MAC address of MXM Repeater radio unit you are currently connected to.
- 5) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater radio unit.

system ip addr <ip></ip>	Use to set IP address of management CPU.
system ip gw <ip></ip>	Use to set IP address of gateway.
<b>system ip mask</b> <mask></mask>	Use to set subnet mask.
system ip mac	Use to show MAC address of management CPU.

### CLI commands (*System → Tools → Console*)

system ip cfg <ip address=""> <mask> or <ip address=""> <mask> <gateway> or <ip address/CIDR&gt; or <ip address/CIDR&gt; <gateway></gateway></ip </ip </gateway></mask></ip></mask></ip>	Use to set IP address and sub or optionally IP address, subnet mask and gateway simultaneously.
system diag ping <ip_address></ip_address>	Use to ping an IP address.

# System $\rightarrow$ Configuration $\rightarrow$ SNMP configuration

The SNMP configuration pages provide configuration of SNMP communities, host and trap addresses. SAF NMS system will work only when SNMP is properly configured.



Relevant MIB files can be downloaded directly from MXM Repeater Web GUI. See (8) below.

<b>SAF</b>	<b>d</b> Main	() Networking	Performance	<b>O</b> System	
System / IP config	FW			Tools	
IP address	Firmware upg	grade		Console	
IP mask	Configuration			About	
IP gateway	IP configurati	ion		Copyright	
Ethernet MAC address	SNMP configuration			Inventory	
	Configuration	n file			
	Password co	nfiguration			
	System confi	guration			
	System servi	ces			
	Diagnostic				
	Download tro	ubleshooting file			

### Status mode

System / SNMP con	figuration		
SNMPv1/v2c setup	SNMPv3 setup	1	
Read community		2 saf-public	
Write community		3 saf-private	
Trap community		4 saf-traps	
List of SNMP managers		5	
List of trap v1 managers		6	
List of trap v2c manager	5	7	
Download MIB file 8			

Press 🦉 MODIFY button.

### Modify mode

SNMPv1/v2c setup	SNMPv3 setup	1	
Read community	2	saf-public	
Write community	3	saf-private	
Trap community	4	saf-traps	
List of SNMP managers	5	Add Delete	
.ist of trap v1 managers	6	Add Delete	
.ist of trap v2c managers	, 7	Add Delete	
0		9 Execute configu	ration

- SNMP v1/v2c setup / SNMP v3 setup Allows switching between status/configuration of SNMP v1/v2c and v3.
- Read community Indicates currently specified read community for SNMP v1/v2c (status mode); allows specifying read community for SNMP v1/v2c of the agent to enable parameters to be read (modify mode). Default read community name is "safpublic".
- Write community Indicates currently specified write community for SNMP v1/v2c (status mode); allows specifying write community for SNMP v1/v2c of the agent to enable parameters to be written (modify mode). Default write community name is "safprivate".
- 4) Trap community Indicates currently specified trap community for SNMP v1/v2c (status mode); allows specifying trap community for SNMP v1/v2c for trap authentication in monitoring applications (modify mode). Default trap community name is "saf-traps".
- 5) List of SNMP managers Shows list of configured SNMP host IP addresses (status mode); allows adding/deleting SNMP host IP addresses (modify mode). Specified IP addresses have access to read and modify configuration parameters using appropriate read and write community names.
- 6) List of trap v1 managers Shows list of configured SNMP trap IP addresses (status mode); allows adding/deleting SNMP trap IP addresses (modify mode). The MXM Repeater management controller sends SNMP traps to the Trap Manager with IP address specified here.

- 7) List of trap v2c managers Shows list of configured SNMP trap IP addresses (status mode); allows adding/deleting SNMP trap IP addresses (modify mode). The MXM Repeater management controller sends SNMP traps to the Trap Manager with IP address specified here.
- 8) Download MIB file Click to download MXM Repeater MIB files.
- 9) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater.

Status mode

System / SNMP cont	Main figuration	Perfo	<b>III</b> ormance	<b>O</b> System		
SNMPv1/v2c setup	SNMPv3	setup	1			
SNMPv3 users						
User name		Auth	nentication 3	password	Privacy password	Access 5
SNMPv3 security settings	8					
Security level		authF	Priv			
User authentication protoco	1	SHA				
Data encryption protocol		AES				
Download MIB file 9						

Press 🦉 MODIFY button.

### Modify mode

<b>SAF</b>	<b>đ</b> Main	<b>II</b> Performa	nce	<b>System</b>			
System / SNMP conf	figuration						
SNMPv1/v2c setup	SNMPv3 s	etup	1				
SNMPv3 users							
User name		Authenti	cation	password	Privacy password		Access
User name (<= 31 charac	ters)		2				
Authentication password	(831 chara	acters)	3				
Privacy password (831	characters)		4				
Access			5	Read Write			
			6	Add Delete			
						7	Execute configuration
SNMPv3 security settings	8						
Security level		authPriv					
User authentication protoco		SHA					
Data encryption protocol		AES					
9							

- SNMP v1/v2c setup / SNMP v3 setup Allows switching between status/configuration of SNMP v1/v2c and v3.
- User name Indicates currently specified SNMPv3 user name (status mode); allows specifying user name which will be used for SNMPv3 user authentication (modify mode).
- Authentication password Indicates currently specified SNMPv3 authentication password (status mode); allows specifying authentication password for SNMPv3 user (modify mode).
- Privacy password Indicates currently specified password for SNMPv3 data AES encryption (status mode); allows specifying password for SNMPv3 data AES encryption (modify mode). AES encryption protocol is used on SNMP agent's side.
- Access Shows enabled access rights (status mode); allows choosing between Read and Write access. Read option is for read-only access, Write option is for read-write access (modify mode).
- 6) By pressing "Add" new user will be added with specified username, passwords and access rights and will be indicated in users list. By pressing "Delete" marked user with its credentials will be deleted from the list.
- 7) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater.
- SNMPv3 security settings shows the Security level, User authentication protocol and Data encryption protocol used on SNMPv3 agent's side. These settings cannot be changed. This information is required while configuring SNMP manager's side.
- 9) Download MIB file Click to download MXM Repeater MIB files.

SNMP manager's IP address must be entered in "SNMPv1/v2c setup" section in lists of "SNMP managers" and "trap v1 managers" or "trap v2 managers".

# System $\rightarrow$ Configuration $\rightarrow$ Configuration file

<b>šA</b> F	Main Netwo	orking Performance	Ç. System	
System / SNMP c	FW		Tools	
SNMPv1/v2c setup	Firmware upgrade Configuration		Console About	
Read community Write community	IP configuration SNMP configuration		Copyright Inventory	
trap community	Configuration file			
List of SNMP manage	Password configuration System configuration			
List of trap v1 manage	System services Diagnostic			
List of trap v2c mana	Download troubleshooti	ng file		

### Status mode

System / Configuration file	
Advanced ofg file features	
Download saved configuration file	
Restore configuration from file	
Restore configuration from saved configuration file	
Restore factory configuration file	
Compare saved / running configurations	
6 Saved configuration	7 Running configuration
<pre>{</pre>	<pre>{</pre>

Press 🥟 MODIFY button.

### Modify mode

0		
System	/ Configuration file	
Advance	ed cfg file features	
Download	I saved configuration file	1Download
Restore co	onfiguration from file <b>2</b> All <b>•</b> from Choose File No file chose	en <b>3</b> <u>Cfg import</u>
Restore co	onfiguration from saved configuration file	4 Cfg restore
Restore fa	actory configuration file	5 Cfg factory
Compare	e saved / running configurations	
	6 Saved configuration 7 Running cor	figuration
<ul> <li>evloy</li> <li>snm</li> <li>perfe</li> <li>i2cd</li> <li>sysd</li> <li>radio</li> <li>netw</li> <li>1)</li> </ul>	gd: {},       { evlogd: {},         pd: {},       { snmpd: {},         d: {},       { snmpd: {},         i: {},       { perfd: {},         i: {},       { izcd: {},         i: {},       { sysd: {},         o: {},       work: {}         Download configuration file - Press to download system configurence	uration txt file and
2) 3)	saving it on your hard drive. <b>Choose File</b> – Press to browse for a saved configuration file on y <b>Cfg import</b> – Press to import a configuration file to MXM Repeat	your hard disk drive. er.
$\triangle$	Uploaded configuration overwrites saved configuration.	
4)	<b>Restore uploaded configuration file</b> – Press to restore uploaded s configuration was not uploaded, saved configuration will be rest changes will be discarded!	system configuration. If tored, i.e. unsaved
$\triangle$	Restoring configuration overwrites running configuration with sav	ed configuration.
5) 6) 7)	<b>Load factory configuration file</b> – Resets system configuration to <b>Saved configuration</b> – Shows saved system configuration.	factory defaults.
()	numing configuration – Shows currently running system config	นเลเบท.

Distinct sections in saved and running configurations are highlighted with orange colour. In order to examine particular differences expand highlighted sections of configuration by clicking on down arrow of appropriate configuration section.

### CLI commands (<u>System → Tools → Console</u>)

configuration factory	Use to reset system configuration to factory defaults.
configuration factory modem	Use to reset modem configuration to factory defaults.
configuration factory sysd	Use to reset whole system configuration to factory defaults.
configuration load	Use to load uploaded system configuration. If no configuration was uploaded via Web GUI, command will restore saved configuration, thus discarding unsaved changes.
configuration status	Use to check whether running configuration is saved.
configuration store	Use to save running configuration.

′!∖

<b>SAF</b>	<b>d</b> Main	() Networking	<b>III</b> Performance	System	
System / Configu	FW			Tools	
Advanced cfg file feat	Firmware upg	irade n		Console	
Download saved configu	IP configuration			Copyright	
Restore configuration fro	SNMP configuration Configuration file			Inventory	
Restore configuration fro	Password co	nfiguration			
Restore factory configur	System configuration System services				
	Diagnostic				
Compare saved / runr Download troubleshooting file					

# System $\rightarrow$ Configuration $\rightarrow$ Password configuration

### Status mode

System / Password configuration				
User configuration				
User name:		admin 🔻 🗹 Enable		
Press 🖉 MODIFY button.				
Modify mode				
System / Password configuration				
User configuration				
User name:	1	admin 🔻 🗹 Enable		
Enter new password ( 432 characters )	2			
Confirm new password ( 432 characters )	3	******		
Hide password 🕑				
			4	Execute configuration

 User name – Choose between "admin" and "guest" user accounts. "guest" user has monitoring privileges and cannot apply configuration changes. "guest" user can be disabled or enabled. "admin" user is always enabled



By default password for "admin" account is '*changeme*', while no password is defined for "guest" account (user disabled).

- 2) Enter new password Enter new password.
- 3) **Confirm new password** Confirm new password.
- 4) Hide password Uncheck to display entered password in plaintext.
- 5) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater.

### CLI commands (<u>System → Tools → Console</u>)

system user info	Use to show information on current user.
system user mgmt <username></username>	Use to set read ("r") or write ("w") access right for
access <r w></r w>	particular <username>.</username>
system user mgmt <username></username>	Use to delete particular <username>. "admin" user cannot</username>
delete	be deleted.
<b>system user mgmt</b> <username> <enable disable></enable disable></username>	Use to enable or disable particular <username>.</username>

system user mgmt <username> info</username>	Use to show information on particular <username>.</username>
<pre>system user mgmt <username> password <password></password></username></pre>	Use to set password for particular <username>.</username>
<b>system user new</b> <username> <password> <r w> <fullname></fullname></r w></password></username>	Use to create new user with specified <username>, <password>, <fullname> and read ("r") or write ("w") permissions.</fullname></password></username>
system user factory	Use to reset user to factory defaults.
<pre>system password change <password></password></pre>	Use to change password for current user.
system password reset	Use to reset all passwords to default.

# System $\rightarrow$ Configuration $\rightarrow$ System configuration

<b>SAF</b>	<b>di</b> Main	() Networking	Performance	System	
System / Passwo	FW			Tools	
User configuration	Firmware upg	rade		Console	
User name:	Configuration			About	
Enter new password ( 4. Confirm new password ( Hide password 🗹	IP configuration SNMP configuration Configuration file Password configuration		Copyright Inventory		
	System config	juration			
	System services				
	Diagnostic Download troubleshooting file				

### Status mode

System / System configuration		
System configuration		
System name ( <= 16 characters )	SAF	
Location name ( <= 16 characters ) 2		and the second se
Timezone 3	GMT+02:00	
Time (YY-MM-DD hh:mm:ss ) 4	2014-12-01 13:01:06	
NTP setup		
NTP client 6	<ul> <li>Enable</li> </ul>	
List of NTP servers 7	192.168.205.111	×



### Modify mode

System / System configuration		
System configuration		
System name ( <= 16 characters )	1	SAF
Location name ( <= 16 characters )	2	
Timezone	3	GMT+02:00 T
Time ( YY-MM-DD hh:mm:ss )	4	2014-12-01 13:01:06
		5 Set local machine time
NTP setup		
NTP client	6	🖉 Enable
List of NTP servers	7	192.168.205.111
		*
		Add Delete
Obtain time from NTP server 8		
		9 Execute configuration

- System name Allows entering preferable system name. Maximum length of the system name cannot exceed 16 symbols. Default name is 'SAF'.
- Location name Allows entering preferable system location name. Maximum length of the location name cannot exceed 16 symbols. By default system location is not specified.
- 3) *Timezone* Allows specifying GMT time zone.
- 4) **Time (YY-MM-DD hh:mm:ss)** Allows changing system date and time manually by entering date and time in specific syntax.
- 5) **Set local machine time** Press to force system to use the time set on your PC or laptop, from which you are connected to the Web GUI.
- 6) NTP client Allows enabling or disabling NTP (Network Time Protocol) client.
- 7) List of NTP servers Allows adding or deleting IP addresses of NTP servers.
- 8) **Obtain time from NTP server** Press to force system to obtain the time from a NTP server.
- 9) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater.

system datetime <datetime></datetime>	Use to enter system time and date. Use "YYYY-MM- DD/hh:mm:ss" syntax for date/time.			
system name <name></name>	Use to define system name.			
system location <location></location>	Use to define system location.			
system uptime	Use to show system uptime since last system start.			
system ntp status	Use to display NTP status.			
system ntp <enable disable></enable disable>	Use to enable or disable NTP client.			
system ntp server add <ip_address></ip_address>	Use to add an IP address of a NTP server.			
<b>system ntp server remove</b> <ip_address></ip_address>	Use to remove an IP address of a NTP server.			
system ntp server clear	Use to clear list of NTP servers.			

### CLI commands (System → Tools → Console)

<b>system ntp timezone</b> <-12:00 14:00>	Use to specify GMT timezone.
system ntp sync	User to force system to obtain the time from a NTP server.

# System $\rightarrow$ Configuration $\rightarrow$ System services

<b>SAF</b>	Main Networking Perfor	mance System	
System / System	FW	Tools	
System configuration	Firmware upgrade	Console	
System name ( <= 16 ch	Configuration	About	
Location name ( <= 16 c Timezone Time ( YY-MM-DD hh:m NTP setup	IP configuration SNMP configuration Configuration file Password configuration System configuration	Copyright Inventory	
NTP client List of NTP servers	System services Diagnostic Download troubleshooting file		
	commode available in our price		1

### Status mode

System / System services					
	WEB service port configuration				
нттр	Enabled				
HTTP port	2 80				
HTTPS	3 Enabled				
HTTPS port	<b>4</b> 443				
Redirect HTTP to HTTPS	5 Disabled				
	RADIUS server configuration				
RADIUS	6 Enabled				
RADIUS port	7 1812				
RADIUS server IP address	8 192.168.205.222				

Press 🥟 MODIFY button.

### Modify mode

System / System services				
		WEB service port configuration		
HTTP	1	Enable		
HTTP port	2	80		
HTTPS	3	I Enable		
HTTPS port	4	443		
Redirect HTTP to HTTPS	5	Enable		
		<b>RADIUS server configuration</b>		
RADIUS	6	Enable		
RADIUS port	7	1812		
RADIUS server IP address	8	192.168.205.222		
Set RADIUS password ( 432 characters	s) <b>9</b>			
Confirm RADIUS password ( 432 chara	cters ) <b>10</b>			
Hide password 🗹	11			
			12 Exec	ute configuration

- 1) **HTTP** Allows disabling or enabling HTTP access to Web GUI. By default HTTP access is enabled.
- HTTP port Allows specifying TCP port for Web GUI access via HTTP. By default TCP port 80 is defined.
- 3) **HTTPS** Allows disabling or enabling HTTPS access to Web GUI. By default HTTPS access is enabled.
- HTTPS port Allows specifying TCP port for Web GUI access via HTTPS. By default TCP port 443 is defined.
- 5) **Redirect HTTP to HTTPS** Allows enabling automatic redirect from HTTP to HTTPS.
- RADIUS Allows enabling or disabling RADIUS (Remote Authentication Dial In User Service). By default RADIUS is disabled.
- 7) RADIUS port Allows specifying RADIUS port. By default port 1812 is defined.
- 8) RADIUS server IP address Allows specifying RADIUS server IP address.
- 9) Set RADIUS password Allows specifying RADIUS password.
- 10) Confirm RADIUS password Allows confirming RADIUS password.
- 11) Hide password Uncheck to display entered password in plaintext.
- 12) By pressing *"Execute configuration"* changes made to the corresponding section apply only for the local side MXM Repeater.

### System $\rightarrow$ Diagnostic $\rightarrow$ Download troubleshooting file

<b>šA</b> F	Main Networking Perfor	mance System	
System / System	FW	Tools	
	Firmware upgrade	Console	
HTTP	Configuration	About	
HTTP port	IP configuration	Copyright	
HTTPS	SNMP configuration	Inventory	
HTTPS port	Configuration file	12	
Redirect HTTP to HTTPS	Password configuration		
	System configuration		
RADIUS	System services		
RADIUS port	Diagnostic		
RADIUS server IP addres	Download troubleshooting file		

Clicking on the link will download troubleshooting file archive package to your hard disk drive ("Downloads" folder of your browser).

Contents:	
config.txt	Saved system configuration file.
devel.tar	For debugging only
eventlog.txt	Alarm-event log file
Firmwares.html	Information on currently running firmware and stored firmware files
Perflog.xml	Performance log with maximum 1440 entries for 1, 15 and 60 minute intervals
Performance.html	Information on alarm status, alarm threshold and sensor configurations
Radio.html	Information on radio status, configuration and counters
SNMP.html	Information on SNMP v1/v2c/v3 configuration

System.html

Information on system configuration including Web services, RADIUS, IP address, user, NTP configuration and inventory info

### System $\rightarrow$ Tools $\rightarrow$ Console

<b>šA</b> F	<b>d</b> Main	() Networking	<b>III</b> Performance	<b>System</b>	
System / Firmwar	FW			Tools	
3.5.19 3.6.5	Firmware upgr	ade		Console	
3.6.6	IP configuration IP configuration SNMP configuration 1 Password configuration 1 System configuration System service Diagnostic Download trout	n ation ile iguration uration es bleshooting file		About Copyright Inventory	
SAF> configuration firmware help license log network product radio snmp system	Main - User - Firm - CLT - Lice - Even - Netw - Prod - Radii - SNMP - Syst	Performant configuration ware update a usage nse commands t / Performar ork functiona uct toolbox o commands configuration em configuration	ce System on commands and information acce log control ality on commands tion	n on ol and configuration	

Console allows to access command line interface (CLI) for configuration of the MXM Repeater using commands. CLI commands are given in each Web GUI describing section of this document.

Use syntax "<command> ?" to see information on subcommands.

Use ← ENTER key to execute entered command.

List of valid CLI commands can be found at the end of each Web GUI page description.

Refer to Chapter 4: COMMAND LINE INTERFACE for details how to connect to other CLI interfaces (serial, SSH, Telnet).

## System $\rightarrow$ About $\rightarrow$ Copyright

### Displays copyright information.

<b>SAF</b>	<b>1</b> Main	() Networking	Performance	System	
System / Firmwar 3.5.19 3.6.5	FW Firmware upg Configuratio	grade n		Tools Console	
3.6.6	Configuration IP configuration SNMP configuration Configuration file Password configuration System configuration System services Diagnostic Download troubleshooting file			Copyright Inventory	

### System / Copyright

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# System $\rightarrow$ About $\rightarrow$ Inventory

### Displays hardware related information.

<b>SAF</b>	4		ы	Çivrtem.	
System / Inventor	Main	Networking	Performance	Table	
	Firmware uno	rade		Console	
MB Sub ID	Configuration	1		About	
MB revision	IP configurati	on		Copyright	
MAC	SNMP configuration			Inventory	
Model	Configuration	file			2
System Contact	Password cor	nfiguration			
Device Name	System config	guration			
Description	System services				
Copyright	Diagnostic				
Product Code	Download troubleshooting file				
Product Serial Number					

<b>HA</b> H	1		ul	\$
ЭЛГ	Main	Networking	Performance	System
System / Inventory				
MB ID		6		
MB Sub ID		1		
MB revision		2		
MAC		000.004.16	6.129.074.049 - 00.	04.A6.81.4A.31
Model		Sprint MXN	/I Repeater	
System Contact		contact		
Device Name		SAF		
Description		Sprint MXN	/I Repeater	
Copyright		Copyright (	c) 2016 SAF Tehnika	i JSC. All rights rese
Product Code		106E1218H	1.	
Product Serial Number		299060300	020	
Enterprise ID		7571		

# Chapter 4: COMMAND LINE INTERFACE

Command line interface (CLI) is available via 2 individual interfaces – Ethernet management port and RS-232 serial management port:

Following CLI accessing options are available:

- Secure Shell (SSH);
- Telnet;
- Serial terminal;
- Web GUI (System→Tools→Console, partial functionality)

The available CLI commands are found in "CLI commands" tables in appropriate Web GUI page sections in <u>Chapter 3: WEB GUI</u>.

For SSH, Telnet or serial connection you can use any client supporting according interfaces (e.g. PuTTY, Tera Term etc.).



CLI commands are not case sensitive.

A User can abbreviate commands and parameters as long as they contain enough letters to be distinguished from any other currently available commands or parameters.

# Connecting to serial RS232 interface

In order to connect to MXM Repeater serial terminal you will require serial Twin-BNC to DB9 cable. Please refer to <u>Chapter 6: INTERFACES</u> for pinouts.

To connect the PC to the RS232 management port, using serial terminal-emulation software (e.g. *PuTTY*), use the following parameters:

- Baud rate: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Data flow control: None

Below are connection steps with **PuTTY** - Windows freeware software.

1. Open <u>*PuTTY*</u> and go to "Serial" category. Specify your COM port number you will be using, change "Speed (baud)" to "115200" and "Flow control" to "None":

Real PuTTY Configuration		×
Category:		
⊡ Session Logging	Options controlling loc Select a serial line	al serial lines
⊡ · Ierminal ···· Keyboard ···· Bell	Serial line to connect to	COM12
Features	Configure the serial line	
	Speed (baud)	115200
Appearance Behaviour	Data <u>b</u> its	8
···· Translation	Stop bits	1
Colours	<u>P</u> arity	None 🔻
Connection	Flow control	None 🔻
Proxy Telnet Rlogin ⊡ SSH Serial		
About	Oper	<u>C</u> ancel

2. Press "Open" and after pressing "Enter" key following login dialog should appear:

B COM12 - PuTTY		×	
		-	
login:			
		-	

- 3. Enter username and password. Default credentials are as follows:
  - login: admin
  - password: changeme
- **4.** After successful login "SAF>" prompt should appear (if system name is default, otherwise prompt will differ):

P COM12 - PuTTY		х	
login:admin password: Login success SAF> <mark>-</mark>			•
			-

**5.** Press "Ctrl+C" to log off from current session.

Closing <u>PuTTY</u> window does not log off from current serial terminal session.

# Connecting to SSH

SSH connection to MXM Repeater radio unit is carried out using Ethernet management connection. Please refer to Chapter "Ethernet management connection configuration" for Ethernet management port connection details.

You can use any SSH client. Below are connection steps with <u>*PuTTY*</u> - Windows freeware software.

1. Open *PuTTY*, choose "Connection Type": "SSH", enter IP address and make sure that correct port number is used ("22" by default):

ategory:		
	Basic options for your Pu	TTY session
Logging	Specify the destination you want to	connect to
	Host Name (or IP address)	Port
Bell	192.168.205.10	22
Features	Connection type: ◎ Ra <u>w</u> ◎ <u>T</u> elnet ◎ Rlogin	SSH ○ Serial
Appearance     Behaviour     Translation     Selection     Colours     Connection     Proxy     Telnet     Rlogin     SSH     SSH     Serial	Load, save or delete a stored sessi Sav <u>e</u> d Sessions	on
	Default Settings	Load Sa <u>v</u> e Delete
	Close window on e <u>x</u> it: Always Never One	nly on clean exit

2. Press "Open", enter login credentials (default user name is *admin* and password - *changeme*). After successful login following prompt should appear:

P COM12 - PuTTY	
login:admin password: Login success SAF>	~
	_

# Connecting to Telnet

Telnet connection to MXM Repeater radio unit is carried out using Ethernet management connection. Please refer to Chapter "Ethernet management connection configuration" for Ethernet management port connection details.

You can use any Telnet client. Below are connection steps with <u>PuTTY</u> - Windows freeware software.

1. Open *PuTTY*, choose "Connection Type": "Telnet", enter IP address and make sure that correct port number is used ("23" by default):

Reputity Configuration	
Category:	
Category: Session Logging Terminal Keyboard Bell Features Window Appearance Behaviour Translation Selection Colours Connection	Basic options for your PuTTY session         Specify the destination you want to connect to         Host Name (or IP address)       Port         192.168.205.10       23         Connection type:       Raw         Raw       Telnet       Rlogin         Saved Sessions       Segial
	Save         Delete         Close window on exit:         Always       Never         Only on clean exit

**2.** Press "Open", enter login credentials (default user name is *admin* and password - *changeme*). After successful login following prompt should appear:



- 0

23

# Chapter 5: TOOLS

# Link Layer Discovery tool

Link Layer Discovery (LLD) tool is a command line application for Microsoft Windows operating systems. This feature allows gathering information from connected MXM Repeater radio units. The tool discovers the IP address and inventory data of connected MXM Repeater radio unit. Additionally, it is possible to reset username/password, management IP address, to perform hardware reboot, factory reset and to store configuration with this tool if it is not possible to do via web GUI or serial command line.

It sends requests to Link Layer Discovery server application which runs on all MXM Repeater radios.



WinPCAP must be installed on the PC

### MXM Repeater discovery procedure

In order to discover the IP address, MAC address and inventory information of MXM Repeater radio unit proceed with the following steps:

- Connect your PC to MXM Repeater radio unit
- Download Link Layer Discovery tool (available from saftehnika.com webpage in "Support->Downloads->Support->Tools" section (registration required) or can be provided by SAF techsupport)
- Open the cmd window on your PC (Go to "Start->Run.." and enter "cmd")
- Navigate to the folder containing previously downloaded and unzipped Link Layer Discovery tool using "cd" command
- Run Link Layer Discovery tool by typing "Ild" and pressing ENTER. Available commands and network adapter list will be displayed:

C:\Windows\system32\cmd.exe

```
C:\Users\Kristians\Documents\Darbs\MXM_repeater\LLD>11d
Usage:
                                                                                                                                                       =
                     <if> - get surroundings
<if> reset <mac> <reset list> - perform sub 3 min reset
<if> safrst <mac> <rk2> <reset list> - perform saf support reset
               11d
Reset command list:
                                          Reset all users/passwords
Factory reset(auto-store, no reset)
Reset management ip addresses
Reset QoS and VLAN
Perform HW reboot
Store configuration
              acc
factory
               mgmt
               network
              reboot
store
        Drk adapter list:
82:19:34:16:CF:B6 \DEVICE\NPF_{DCE5B59F-FE6D-4D10-8713-901779E58187}
ip : 0.0.0.0
82:19:34:16:CF:B5 \DEVICE\NPF_{F7E906CE-F198-4CB0-AFD8-02100A14BB73}
  etwork
   2.
        ip: 0.0.0
80:19:34:16:CF:B5 \DEVICE\NPF_<EC54FE77-97B7-42DB-AE9E-57041E855F4C>
ip: 192.168.110.161
80:19:34:16:CF:B9 \DEVICE\NPF_<6DB8E693-E51B-44BB-AFFB-93C072799AA8>
         ip : 0.0.0.0
EC:F4:BB:6F:8E:CF
                                          \DEVICE\NPF_{739C82BF-BFCF-459F-8406-94469F99B1A7}
   5.
                       192.168.205.20
  :\Users\Kristians\Documents\Darbs\MXM_repeater\LLD>
```

• To discover MXM Repeater device following command must be entered: Ild <network interface>, where <network interface> is the Network interface of PC connected to the

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MXM repeater or to the network for discovering the MXM Repeater unit. Choose it from the network adapter list. Example: Ild \DEVICE\NPF\_{739C82BF-BFCF-459F-8406-94469F99B1A7}

"Network interface" name will be easier to enter by using copy/paste option:

- click the right mouse button over the console and select "Mark",
- then by holding the left button select the interface address,
- Paste it by clicking the right button on the command line after typing "Ild" and selecting "Paste"

C:\Windows\system32\cmd.exe	
C:\Users\Kristians\Documents\Darbs\MXM_repeater\LLD>11d Usage:	* E
lla (17) – get surroundings lld (if) reset (mac) (reset list) – perform sub 3 min reset lld (if) safrst (mac) (rk2) (reset list) – perform saf support reset	
Reset command list:	
acc – Reset all users/passwords	
factory - Factory reset(auto-store, no reset)	
ngmt – reset management ip addresses	
reboot – Perform HW reboot	
store - Store configuration	
Natural adapted list.	
1. 82:19:34:16:CF:B6 \DEVICE\NPF_{DCE5B59F-FE6D-4D10-8713-901779E58187}	
ip : 0.0.0.0	
2. 82:19:34:16:CF:B5 \DEVICE\NPF_KF7E906CE-F198-4CB0-AFD8-02100A14BB73>	
1p : 0.0.0.0 3. 80:19:34:16:CF:B5 \DEUICE\NPF {EC54FE77-97B7-42DB-AF9E-57041F855F4C}	
ip : 192.168.110.161	
4. 80:19:34:16:CF:B9 \DEVICE\NPF_(6DB8E693-E51B-44BB-AFFB-93C072799AA8)	
5. EC:F4:BB:6F:8E:CF \DE01CE\NFF_{739C82BF-BFCF-459F-8406-94469F99B1H73 ip : 192.168.205.20	
C:\Users\Kristians\Documents\Darbs\MXM_repeater\LLD>11d \DEVICE\NPF_{739C82BF-BF CF-459F-8406-94469F99B1A7>	-

Available devices and its information will appear in the console after pressing ENTER:

C:\Windows\system32\cmd.exe	
<pre>Network adapter list: 1. 82:19:34:16:CF:B6 \DEUICE\NPF_{DCE5B59F-FE6D-4D10-8713-901779E5818' ip: 0.0.0 2. 82:19:34:16:CF:B5 \DEUICE\NPF_{F7E906CE-F198-4CB0-AFD8-02100A14BB7' ip: 0.0.0 3. 80:19:34:16:CF:B5 \DEUICE\NPF_{EC54FE77-97B7-42DB-AE9E-57041E855F4( ip: 192.168.110.161 4. 80:19:34:16:CF:B9 \DEUICE\NPF_{6DB8E693-E51B-44BB-AFFB-93C072799AA4 ip: 0.0.0 5. EC:F4:BB:6F:8E:CF \DEUICE\NPF_{739C82BF-BFCF-459F-8406-94469F99B1A' ip: 192.20</pre>	7> ^ 3> c> 8> 7>
- C:\Users\Kristians\Documents\Darbs\MXM_repeater\LLD>11d \DEVICE\NPF_{73 CF-459F-8406-94469F99B1A7> Collecting surrounding data Dev #0 Dev #1	7C82BF-BF
RK1 : CB5BEF90D58F6FAB269DF56A300F523D5D85CD46 RK1 fresh : true device name : SAF model : Sprint MXM Repeater product number : I06E2110HA sw version : fw2 / 3.6.9 MAC : 0004A6814A48 ip address : 192.168.205.10 ip mask : 255.255.255.0	
C:\Users\Kristians\Documents\Darbs\MXM_repeater\LLD>_	~

Link Layer Discovery tool commands				
Command	Description			
lld	Use to run Link Layer Discovery (LLD) tool. It will display available commands and network adapter list			
lld <network interface=""></network>	Use to scan and discover MXM Repeater devices. <network interface=""> is the PC's network interface connected to the MXM Repeater locally or remotely</network>			
lld <network interface=""> reset <mac_addr> acc</mac_addr></network>	Use to reset all users/passwords of MXM Repeater. <mac_addr> is the MAC address of the MXM Repeater</mac_addr>			
lld <network interface=""> reset <mac_addr> factory</mac_addr></network>	Use to perform factory reset of MXM Repeater.			
lld <network interface=""> reset <mac_addr> mgmt</mac_addr></network>	Use to reset management IP address of MXM Repeater			
lld <network interface=""> reset <mac_addr> reboot</mac_addr></network>	Use to perform hardware reboot for MXM Repeater			
lld <network interface=""> reset <mac_addr> store</mac_addr></network>	Use to store configuration			

### MXM Repeater resetting procedure

In order to reset username/password or management IP address, or to perform factory reset or hardware reboot for MXM Repeater unit proceed with the following steps:

- Power-cycle the MXM Repeater unit by disconnecting power supply
- Resetting procedure can be performed during 3 minutes after MXM Repeater reboot. It is indicated as value "RK1 fresh: true" in inventory information which is displayed during MXM Repeater discovery procedure as described above. Resetting procedure will not be possible if value "RK1 fresh" will be indicated as "false" (RK1 fresh: false)

DX1	-	CB5BEF90D58F6FAB269DF56A300F523D5D85CD46
RK1 fresh	:	true
device name		SHF
model		Sprint MXM Repeater
product number	-	IÔ6E2110HA
sw version	=	fw2 / 3.6.9
MAC	-	0004A6814A48
ip address		192.168.205.10
ip mask	=	255.255.255.0

- Use the MAC address of MXM Repeater with the reset command to reset the device. MAC address is shown in inventory information

RK1	=	CB5BEF90D58F6FAB269DF56A300F523D5D85CD46
RK1 fresh		true
device name	-	SAF
model		Sprint MXM Repeater
product number	=	I06E2110HA
sw version	÷	fu2 / 3 6 9
MAC	:	000446814448
ip address		172.168.205.10
ip mask	:	255.255.255.0

 While value "RK1 fresh: true" enter command for resetting MXM Repeater: Ild <network interface> reset <MAC\_addr> <reset command>, where <MAC\_addr> is MAC address of particular MXM Repeater unit, and <reset command> is one of commands given in the Link Layer Discovery tool command's table above. The example of command which resets username/password and successful result is shown in the following screenshot:

🚾 C:\Windows\system32\cmd.exe	
CF-459F-8406-94469F99B1A7> Collecting surrounding data Dev #0	*
Dev #1 RK1 : AFDC0C7A88C02FD1C4EFD58584413DB84BF904AC RK1 fresh : true device name : SAF model : Sprint MXM Repeater product number : I06E2110HA sw version : fv2 / 3.6.9 MAC : 0004A6814A48 ip address : 192.168.205.10 immack : 2FE 2FE @	III
C:\Users\Kristians\Documents\Darbs\MXM_repeater\LLD>11d \DEVICE\NPF_{739C82BF-BF CF-459F-8406-94469F99B1A7> reset 0004A6814A48 acc Collecting surrounding data Wait for responce Responce #0: Unknown field	
MAC : UUU4Ab814A48 Responce #0: MSG : Performing reset sequence. Please wait C:\Users\Kristians\Documents\Darbs\MXM_repeater\LLD>	Ŧ

# MIB files



Relevant MIB files can be downloaded directly from MXM Repeater Web GUI. See Chapter "System  $\rightarrow$  Configuration  $\rightarrow$  SNMP configuration" for further details.



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