

Frequency	Per BCCH ARFCN
RBW	30 kHz (See Note below)
VBW	10 kHz
Ref Level	+45 dBm
Sweep	Auto
Video Average	On (100 samples)



Note

Note - This measurement must be taken in a 30 kHz RBW in case an alternate channel local carrier is nearby the BCCH, which would then give an artificially high reading if 300 kHz RBW were used.

4. If the BTS is not turned on, turn on the circuit breakers. The BTS will boot up and receive the MIB download, activating the BCCH channel.
5. After the BTS has booted, verify that the BCCH is at the correct frequency by observing the spectrum analyzer and correlating the center frequency with the ARFCN for RF 0.
Refer to Appendix E to obtain the BTS transmit frequency.
6. Use the spectrum analyzer's **Marker** in **Peak** mode, and measure the RF output power in dBm at the TX Monitor port. Since the Tx Monitor port is inclusive of the HPA to Filter coax and the Filter loss, it should be **+43.0 dBm ±0.5 dB**.
7. If the level measured at the TX Monitor output is **+43.0 dBm ±0.5 dB**, this procedure is complete. If you performed this procedure as part of the initial BTS installation, return to [Section 3.4](#) and fill out the BTS-4000RM Installation Quick Checklist form.

If the level measured at the TX Monitor output is too high or too low, connect a console to the BTS-4000RM BPU as described in Section 2.1, and then perform the following steps:

- a) Use the **rfStuff** command to view the current attenuation level. Following is an example of the rfStuff output:

```
rfStuff
=====
                        0          1          2          3
=====
bdxState:  Operational  NotDetected  NotDetected  NotDetected
BDX board rev:      810           0           0           0
BDX Ctrl FPGA rev:   29           0           0           0
BDX TDM FPGA rev:   18           0           0           0
BDX ModelType:      GSM 850       ???       ???       ???
Temperature:        37C          0C          0C          0C
Tx Enable:          Disabled      Disabled      Disabled      Disabled
Tx RF Level (atten):  9.5dB        0.0dB        0.0dB        0.0dB
Extra HPA Atten:      7dB         7dB         7dB         7dB
Extra RF Atten:       0dB         0dB         0dB         0dB
Serial Number BDX 0:  SN0452BXA01160
ARFCN Status BDX 0:  baseArfcn = 128, numActiveRfs = 0
```

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```
BDX 0 TMA:   Tx/Rx:  ENABLED ->      Normal - 88mA
              Rx:    ENABLED ->      Normal - 88mA
BDX Alarms:
  A/D Clock Unlock      ok           -           -           -
  TX RF Synth Unlock    ok           -           -           -
  RX RF Synth Unlock    ok           -           -           -
  TX IF Synth Unlock    ok           -           -           -
  RX IF Synth Unlock    ok           -           -           -
  TDM Sync Fail         ok           -           -           -
  TDM Clock Fail        ok           -           -           -
  GSM Frame Sync Fail   ok           -           -           -
  Missing 1PPS Input    ok           -           -           -
  DDC Sync Fail         ok           -           -           -
  DUC Sync Fail         ok           -           -           -
value = 73 = 0x49 = 'I'
AirNet BTS->
```

- b) Note the current Tx RF attenuation level.
- c) Use the **settxlevel** command to change the TX RF Level Attenuation value. The **settxlevel** command is used by AirNet manufacturing and in the field to adjust the BDX transmit level to match the gain of the HPA and other components in the transmit path. The default is 4.0 dB of attenuation, but the current level is displayed with the rfStuff command. The setting can be adjusted from 0 dB to 15.5 dB in 0.5 dB steps. The new transmit level attenuation takes effect immediately and is stored in BDX flash, so it stays in effect after reboots.

The syntax for the **settxlevel** command is shown below:

```
settxlevel <board num>, "<attenuation in dB>"
board num = BDX board number (0 to 3)
attenuation = Amount that the BDX attenuates the transmit path
              (from 0.0 to 15.5 dB in 0.5 dB steps). 4.0 dB is
              the default in BDX. Put double-quotes around the
              attenuation value, as shown.
```



Note

Note - The attenuation level is in dB and must have one digit after the decimal point (i.e., 5 must be entered as 5.0).

Following is an example of how the **settxlevel** command would be used if the BTS-4000RM output were 1 dB too hot:

```
AirNet BTS->settxlevel 0, "5.0"
Writing Flash BDX Transmit RF level to 5.0
Current BDX Transmit RF level is 4.0
Setting BDX Transmit RF level to 5.0

Successfully wrote RF Tx Attenuation 5.0 to flash value = 0 = 0x0
AirNet BTS->
```

- 8) Repeat Steps 6 and 7 until the output is **+43.0 dBm ±0.5 dB**.
- 9) Record the final Tx output level.

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- 10) If you performed this procedure as part of the initial BTS installation, return to [Section 3.4](#) and fill out the BTS-4000RM Installation Quick Checklist form.



Stop – The transmit gain adjustment procedure is complete.

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6. TECHNICAL SUPPORT

AirNet provides several support services that cover all aspects of BSS equipment, from initial system planning through deployment and operation. Once a system is in operation and has been conditionally accepted, the AirNet Customer Response Center (CRC) is available and responsible for answering technical questions or addressing technical problems.

Access to the CRC is typically available to AirNet customers for one year from the original date of purchase of the AirNet BSS equipment. Access to the CRC may be extended beyond the one-year period by purchasing a maintenance agreement from AirNet. In addition to extending access to the AirNet CRC, the maintenance agreement may also include software upgrades⁴ for purchased AirNet products as well as participation in the Depot Maintenance Program. Contact the AirNet Sales Department for more information on purchasing a maintenance agreement⁵.

6.1 Customer Response Center

Answers to specific technical questions may not be available in the user documentation due to the complexity of wireless systems. If this is the case, customers may contact the AirNet Customer Response Center to ask a technical question, report a problem and even suggest product enhancements.

The Customer Response Center should also be contacted for major upgrades to network components, including major database changes, frequency plan modifications, and upgrades to the MSC. When advance notice of major upgrades is received, the Customer Response Center can assist this activity by providing an analysis of potential impacts to BSS performance or quickly responding if problems should arise.

When a message or call from a customer is received, an incident report will be generated and a tracking number assigned. The tracking number should be referenced regarding any questions or information related to the initial incident report with the CRC.

When contacting the CRC, the following information should be provided:

- Customer's Company Name,
- Person's name contacting the CRC,
- Customer email address, phone number, and/or fax number⁶,
- Incident Type: technical question, product defect, or suggested enhancement,
- AirNet product - for the question, incident, or suggested enhancement, and
- Detailed description of the question, incident, or suggested enhancement.

If the contact is regarding a technical problem, the following additional information should be provided:

- Time and date of the incident.

⁴ Upgrades for certain software features (e.g. data and fax features) may include an additional charge.

⁵ Terms of a maintenance agreement may vary from customer to customer. Conditions included in this document are subject to change without notice, but are specified in the maintenance agreement.

⁶ A response is typically sent using the same method the message was received unless otherwise requested by the customer.

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- Software release of the product in question.
- Any steps taken that may have caused the incident or that may be used to reproduce the incident.
- The severity level for the incident based on the following guidelines:
 - Critical - System does not function or critical aspects of the system are not controllable.
 - High - System functions; however, invoking certain functions may cause the system to crash or cause some dangerous results.
 - Medium - System functions and is fairly stable. A work-around may have been determined to temporarily mitigate the problem, or there may be missing non-critical functionality with otherwise stable operation.
 - Low - System is useable and stable. There is a minor performance or design issue that should be addressed.

When the CRC is contacted for a problem, the problem will be quickly analyzed. If possible, a temporary fix may be suggested to mitigate the problem until a final solution can be incorporated. Once the customer is fully satisfied that the issue in the original incident report has been fully addressed, the incident report will be closed.

As part of a maintenance agreement for customer access the CRC, the customer may agree to provide remote access for CRC personnel at AirNet's facilities to the customers BSS equipment. Remote access by CRC personnel to customer's equipment is typically at the discretion and control of the customer. However, by providing remote access, AirNet technical personnel may more quickly resolve technical issues that can arise.

6.2 Contacting the Customer Response Center

There are several options for getting questions answered, having a specific problem addressed, or suggesting a product enhancement.

6.2.1 Electronic Mail

The Customer Response Center can be contacted via email at the following Internet address:

AirNetCRC@airnetcom.com

When sending the CRC an email message, please include the information specified in Section 6.1. An acknowledgment of your email message will be sent within one business day.

6.2.2 FAX

If email is not available, then the Customer Response Center can be contacted via fax at the following fax number:

1-321-757-0624

As with email, please include the information requested in Section 6.1. Please allow one business day for an acknowledgement of your fax to be returned.

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6.2.3 Phone

The CRC may be contacted by phone for any issues, 24 hours a day, 7 days a week, at the following telephone number:

+1-321-953-6673

The information listed in Section 6.1 should be provided when contacting a CRC representative.

The phone number listed above should be used for all critical issues rather than the main AirNet business number, email, or fax. This ensures a prompt response.



Note

Note - The CRC 1-888 number should be used for all critical issues to ensure a prompt response.

6.3 Product Change Requests

If the CRC is contacted concerning a problem or a product enhancement, a Product Change Request (PCR) may be generated. PCRs are generated for issues that must be addressed in the design of the product. For critical items, the PCR may be addressed in the next maintenance ("Point") release. For extremely critical items, the PCR may be addressed in an interim "quick" patch release that specifically addresses the problem. Enhancements are typically addressed in future major software releases. The specific software release that addresses a PCR is at the discretion of AirNet.

After the cause of a problem has been found, the method and time frame for addressing the PCR is determined by AirNet based on customer need, the PCR criticality, and whether an adequate workaround is available to address the problem.

If a PCR is generated due to a customer issue, the PCR number will be cross-referenced to the original incident tracking number. The customer will be informed of the PCR number and the time frame for its resolution.

When the PCR has been addressed and thoroughly tested, the software incorporating the PCR will be released and automatically sent to the customers covered under the software maintenance program. In many cases, AirNet personnel will assist in the installation of the new software release.

Please note that known problems are documented as PCRs in the product release notice associated with the software release installed in the system. The product release notice should be referenced to avoid actions that could cause unstable operation for known problems or to invoke corrective actions for problems that may have already occurred.



Note

Note - Known problems addressed by PCRs are documented in the Product Release Notice for the software release installed on AirNet BSS equipment.

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6.4 Returning Material

Refer to Appendix G for AirNet's Material Return Authorization (RMA) procedure.

6.4.1 Advanced Replacement Program

At an additional cost, customers may participate in the AirNet Advanced Replacement Program. Under this program, a replacement module will be sent within 24 hours of contacting the CRC and obtaining an RMA number. The faulty item must still be returned, but AirNet will not wait to receive the faulty item to send its replacement. Contact the CRC or the AirNet Sales Department for more information on the Advanced Replacement Program.



Note

Note - Failure to return defective items or for failures caused by events not covered by the warranty can result in the customer being invoiced for items shipped under the Advanced Replacement Program. Review the maintenance agreement for specific terms of the agreement.

6.4.2 Roto-Pool System

When a replacement part is sent to a customer, it may or may not be the repaired faulty module that was received from the customer. AirNet uses a “roto-pool” system for replacement modules. If a faulty item that is received by AirNet is repairable, it will be re-stocked in our “roto-stock” system once repaired. The module will also be upgraded to the latest revision. AirNet ships replacement parts from the roto-pool. The replacement item is typically shipped before the faulty returned item is repaired. The roto-pool system allows faster return of replacement parts.

Replacement parts are fully tested before being placed in the roto-pool. Roto-pool items also carry a full AirNet warranty from the date of original purchase of the module.

6.5 Software Maintenance Program

Purchases of new base station systems typically include the AirNet software maintenance program for a period of one year from purchase of the system. The maintenance program includes software upgrades⁷ during the program period. The software maintenance program can be purchased beyond the first year. Contact the AirNet Sales Department or the CRC for more information on the software maintenance program.

6.6 Depot Maintenance Program

BSS hardware typically includes a one-year warranty from the date of purchase. The depot maintenance program may be purchased to extend the warranty of hardware components beyond the first year. Additionally, the Advance Replacement Program may be included for hardware covered under warranty. Contact the AirNet Sales Department or the CRC for more information about extending the warranty under the Depot Maintenance Program or about the Advanced Replacement Program.

⁷ Upgrades for certain software features (e.g. data and fax features) may include an additional charge.

Appendix A – Acronyms

ADC	Analog-to-Digital Converter
AGC	Automatic Gain Control
ARFCN	Absolute Radio Frequency Channel Number
ASP	Automatic Service Provisioning
AWG	American Wire Gauge
BCCH	Broadcast Control Channel
BDX	Broadband Digital Transceiver
BPU	Broadband Processing Unit
BSC	Base Station Controller
BSIC	Base Station Identity Code
BSS	Base Station System
BTS	Broadband Transceiver System
CPU	Central Processing Unit
CRC	(AirNet) Customer Response Center
CSD	Circuit Switched Data
CSV	Circuit Switched Voice
DAC	Digital-to-Analog Converter
DSP	Digital Signal Processor
EDGE	Enhanced Data Rates for GSM Evolution (AirNet)
ESD	Electrostatic Discharge
FCC	Federal Communications Commission
FRU	Field Replaceable Unit
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HLR	Home Location Register
HPA	High Power Amplifier
HSO	High Stability Oscillator
IF	Intermediate Frequency
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol

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ISDN	Integrated Services Digital Network
LAC	Location Area Code
LED	Light Emitting Diode
LMT	Local Maintenance Terminal
MCC	Mobile Country Code
MIB	Management Information Base
MNC	Mobile Network Code
MS	Mobile Station
MSC	Mobile Switching Center
NSEI	Network Service Entity
NSVCI	Network Service Virtual Circuit Identifier
PBX	Private Branch Exchange
PCM	Pulse Code Modulation
PCR	Product Change Request
PCU	Packet Control Unit
PRI	Primary Rate Interface
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RMA	Return Material Authorization
RX	Receive
SIP	Session Initiation Protocol
SGSN	Serving GPRS Support Node
SCTP	Stream Control Transmission Protocol
SMA	SubMiniature Version A
SMS	Short Message Service
SPC	Signaling Point Code
SS7	Signaling System No. 7
SUA	SS7 SCCP - User Adaption Layer
TCH	Traffic Channel
TDM	Time Division Multiplexing
TRAU	Transcoder and Rate Adaption Unit
TTY	Terminal Emulator
TX	Transmit
VoIP	Voice over Internet Protocol

PRELIMINARY

VME VersaModule Eurocard (bus)

PRELIMINARY

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Appendix B - I/O Connector Pinouts

Ethernet Port

The Ethernet port is located on the rear I/O panel of the BTS-4000RM BPU (see Figure 1-10). The following table provides the pinouts of the Ethernet port.

Pin	Signal
1	TX+
2	TX-
3	RX+
4	---
5	---
6	RX-
7	---
8	---

Fan I/O (HPA)

The FAN I/O port on the HPA I/O panel is used to send alarms to the BPU. A pinout of this port is shown below.

Pin	Signal
1	+
2	-
3	+
4	-
5	+
6	FAN ALARM 1
7	FAN ALARM 2
8	FAN ALARM 3
9	---
10	NC

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RS-422 Port (BPU)

The RS-422 port on the BPU I/O panel is used to communicate with the HPA. A pinout of this port is shown below.

Pin	Signal
1	RX-
2	RX+
3	TX-
4	TX+
5	NC
6	AMP ID 2
7	AMP ID 1
8	AMP ID 0
9	NC

RS-422 Port (HPA)

The RS-422 port on the HPA I/O panel is used to communicate with the BPU. A pinout of this port is shown below.

Pin	Signal
1	TX-
2	TX+
3	RX-
4	RX+
5	NC
6	AMP ID 2
7	AMP ID 1
8	AMP ID 0
9	NC

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Serial Port

The RJ-45 Serial port is located on the front panel of the ICE-T card in the BTS-4000RM BPU. It is used to connect a computer to the BPU for console mode access. The following table provides the pinouts of the Serial port.

RJ-45 Pin	Function	DB9-F Pin
1	NC	---
2	NC	---
3	Receive Data	3
4	NC	---
5	Transmit Data	2
6	NC	---
7	Ground	5
8	NC	---

T1/E1 Port

The T1/E1-A and T1/E1-B ports are located on the rear panel of the BTS-4000RM BPU (see Figure 1-10).

The following table provides the pinouts of the T1/E1 ports.

Pin	Signal
1	RX Ring
2	RX Tip
3	---
4	TX Ring
5	TX Tip
6	---
7	---
8	---

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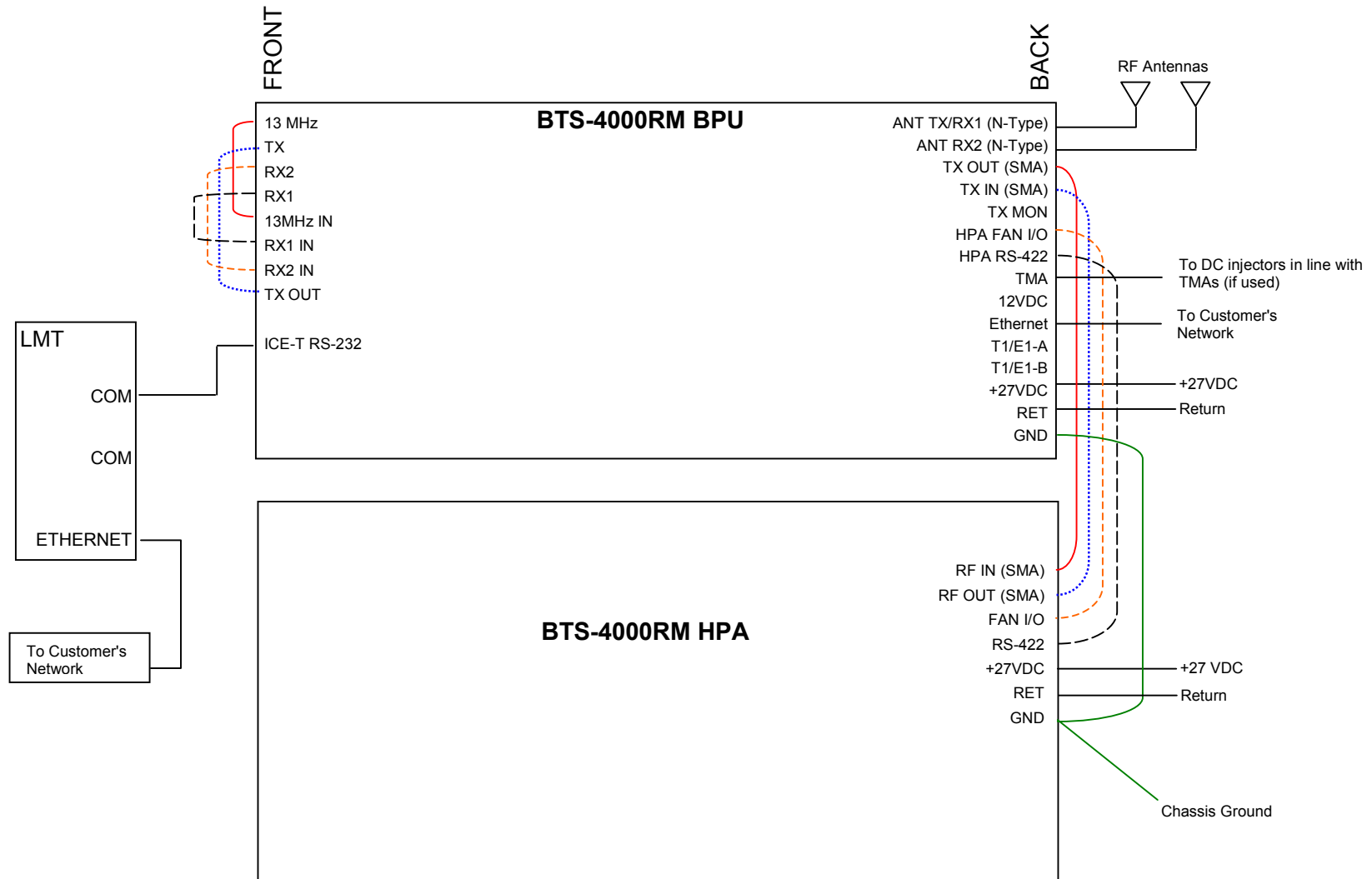
TMA Port

The DB-9 TMA port is located on the rear panel of the BTS-4000RM BPU (see Figure 1-10). It provides power to Tower Mounted Amplifiers (TMAs). The following table provides the pinouts of the TMA port.

Pin	Signal
1	TMA PWR A1
2	TMA PWR A1
3	GND
4	TMA PWR A2
5	TMA PWR A2
6	GND
7	GND
8	GND
9	---

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Appendix C - BTS-4000RM Block Diagram



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Appendix D - dBm-to-Watts Conversion Table

dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts
20.0	0.100	25.0	0.316	30.0	1.00	35.0	3.16	40.0	10.00	45.0	31.62	50.0	100.00	55.0	316.23	60.0	1000.00
20.1	0.102	25.1	0.324	30.1	1.02	35.1	3.24	40.1	10.23	45.1	32.36	50.1	102.33	55.1	323.59	60.1	1023.29
20.2	0.105	25.2	0.331	30.2	1.05	35.2	3.31	40.2	10.47	45.2	33.11	50.2	104.71	55.2	331.13	60.2	1047.13
20.3	0.107	25.3	0.339	30.3	1.07	35.3	3.39	40.3	10.72	45.3	33.88	50.3	107.15	55.3	338.84	60.3	1071.52
20.4	0.110	25.4	0.347	30.4	1.10	35.4	3.47	40.4	10.96	45.4	34.67	50.4	109.65	55.4	346.74	60.4	1096.48
20.5	0.112	25.5	0.355	30.5	1.12	35.5	3.55	40.5	11.22	45.5	35.48	50.5	112.20	55.5	354.81	60.5	1122.02
20.6	0.115	25.6	0.363	30.6	1.15	35.6	3.63	40.6	11.48	45.6	36.31	50.6	114.82	55.6	363.08	60.6	1148.15
20.7	0.117	25.7	0.372	30.7	1.17	35.7	3.72	40.7	11.75	45.7	37.15	50.7	117.49	55.7	371.54	60.7	1174.90
20.8	0.120	25.8	0.380	30.8	1.20	35.8	3.80	40.8	12.02	45.8	38.02	50.8	120.23	55.8	380.19	60.8	1202.26
20.9	0.123	25.9	0.389	30.9	1.23	35.9	3.89	40.9	12.30	45.9	38.90	50.9	123.03	55.9	389.05	60.9	1230.27
21.0	0.126	26.0	0.398	31.0	1.26	36.0	3.98	41.0	12.59	46.0	39.81	51.0	125.89	56.0	398.11	61.0	1258.93
21.1	0.129	26.1	0.407	31.1	1.29	36.1	4.07	41.1	12.88	46.1	40.74	51.1	128.82	56.1	407.38	61.1	1288.25
21.2	0.132	26.2	0.417	31.2	1.32	36.2	4.17	41.2	13.18	46.2	41.69	51.2	131.83	56.2	416.87	61.2	1318.26
21.3	0.135	26.3	0.427	31.3	1.35	36.3	4.27	41.3	13.49	46.3	42.66	51.3	134.90	56.3	426.58	61.3	1348.96
21.4	0.138	26.4	0.437	31.4	1.38	36.4	4.37	41.4	13.80	46.4	43.65	51.4	138.04	56.4	436.52	61.4	1380.38
21.5	0.141	26.5	0.447	31.5	1.41	36.5	4.47	41.5	14.13	46.5	44.67	51.5	141.25	56.5	446.68	61.5	1412.54
21.6	0.145	26.6	0.457	31.6	1.45	36.6	4.57	41.6	14.45	46.6	45.71	51.6	144.54	56.6	457.09	61.6	1445.44
21.7	0.148	26.7	0.468	31.7	1.48	36.7	4.68	41.7	14.79	46.7	46.77	51.7	147.91	56.7	467.74	61.7	1479.11
21.8	0.151	26.8	0.479	31.8	1.51	36.8	4.79	41.8	15.14	46.8	47.86	51.8	151.36	56.8	478.63	61.8	1513.56
21.9	0.155	26.9	0.490	31.9	1.55	36.9	4.90	41.9	15.49	46.9	48.98	51.9	154.88	56.9	489.78	61.9	1548.82
22.0	0.158	27.0	0.501	32.0	1.58	37.0	5.01	42.0	15.85	47.0	50.12	52.0	158.49	57.0	501.19	62.0	1584.89
22.1	0.162	27.1	0.513	32.1	1.62	37.1	5.13	42.1	16.22	47.1	51.29	52.1	162.18	57.1	512.86	62.1	1621.81
22.2	0.166	27.2	0.525	32.2	1.66	37.2	5.25	42.2	16.60	47.2	52.48	52.2	165.96	57.2	524.81	62.2	1659.59
22.3	0.170	27.3	0.537	32.3	1.70	37.3	5.37	42.3	16.98	47.3	53.70	52.3	169.82	57.3	537.03	62.3	1698.24
22.4	0.174	27.4	0.550	32.4	1.74	37.4	5.50	42.4	17.38	47.4	54.95	52.4	173.78	57.4	549.54	62.4	1737.80
22.5	0.178	27.5	0.562	32.5	1.78	37.5	5.62	42.5	17.78	47.5	56.23	52.5	177.83	57.5	562.34	62.5	1778.28
22.6	0.182	27.6	0.575	32.6	1.82	37.6	5.75	42.6	18.20	47.6	57.54	52.6	181.97	57.6	575.44	62.6	1819.70
22.7	0.186	27.7	0.589	32.7	1.86	37.7	5.89	42.7	18.62	47.7	58.88	52.7	186.21	57.7	588.84	62.7	1862.09
22.8	0.191	27.8	0.603	32.8	1.91	37.8	6.03	42.8	19.05	47.8	60.26	52.8	190.55	57.8	602.56	62.8	1905.46
22.9	0.195	27.9	0.617	32.9	1.95	37.9	6.17	42.9	19.50	47.9	61.66	52.9	194.98	57.9	616.60	62.9	1949.84
23.0	0.200	28.0	0.631	33.0	2.00	38.0	6.31	43.0	19.95	48.0	63.10	53.0	199.53	58.0	630.96	63.0	1995.26
23.1	0.204	28.1	0.646	33.1	2.04	38.1	6.46	43.1	20.42	48.1	64.57	53.1	204.17	58.1	645.65	63.1	2041.74
23.2	0.209	28.2	0.661	33.2	2.09	38.2	6.61	43.2	20.89	48.2	66.07	53.2	208.93	58.2	660.69	63.2	2089.30
23.3	0.214	28.3	0.676	33.3	2.14	38.3	6.76	43.3	21.38	48.3	67.61	53.3	213.80	58.3	676.08	63.3	2137.96
23.4	0.219	28.4	0.692	33.4	2.19	38.4	6.92	43.4	21.88	48.4	69.18	53.4	218.78	58.4	691.83	63.4	2187.76
23.5	0.224	28.5	0.708	33.5	2.24	38.5	7.08	43.5	22.39	48.5	70.79	53.5	223.87	58.5	707.95	63.5	2238.72
23.6	0.229	28.6	0.724	33.6	2.29	38.6	7.24	43.6	22.91	48.6	72.44	53.6	229.09	58.6	724.44	63.6	2290.87
23.7	0.234	28.7	0.741	33.7	2.34	38.7	7.41	43.7	23.44	48.7	74.13	53.7	234.42	58.7	741.31	63.7	2344.23
23.8	0.240	28.8	0.759	33.8	2.40	38.8	7.59	43.8	23.99	48.8	75.86	53.8	239.88	58.8	758.58	63.8	2398.83
23.9	0.245	28.9	0.776	33.9	2.45	38.9	7.76	43.9	24.55	48.9	77.62	53.9	245.47	58.9	776.25	63.9	2454.71

PRELIMINARY

dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts
24.0	0.251	29.0	0.794	34.0	2.51	39.0	7.94	44.0	25.12	49.0	79.43	54.0	251.19	59.0	794.33	64.0	2511.89
24.1	0.257	29.1	0.813	34.1	2.57	39.1	8.13	44.1	25.70	49.1	81.28	54.1	257.04	59.1	812.83	64.1	2570.40
24.2	0.263	29.2	0.832	34.2	2.63	39.2	8.32	44.2	26.30	49.2	83.18	54.2	263.03	59.2	831.76	64.2	2630.27
24.3	0.269	29.3	0.851	34.3	2.69	39.3	8.51	44.3	26.92	49.3	85.11	54.3	269.15	59.3	851.14	64.3	2691.53
24.4	0.275	29.4	0.871	34.4	2.75	39.4	8.71	44.4	27.54	49.4	87.10	54.4	275.42	59.4	870.96	64.4	2754.23
24.5	0.282	29.5	0.891	34.5	2.82	39.5	8.91	44.5	28.18	49.5	89.13	54.5	281.84	59.5	891.25	64.5	2818.38
24.6	0.288	29.6	0.912	34.6	2.88	39.6	9.12	44.6	28.84	49.6	91.20	54.6	288.40	59.6	912.01	64.6	2884.03
24.7	0.295	29.7	0.933	34.7	2.95	39.7	9.33	44.7	29.51	49.7	93.33	54.7	295.12	59.7	933.25	64.7	2951.21
24.8	0.302	29.8	0.955	34.8	3.02	39.8	9.55	44.8	30.20	49.8	95.50	54.8	302.00	59.8	954.99	64.8	3019.95
24.9	0.309	29.9	0.977	34.9	3.09	39.9	9.77	44.9	30.90	49.9	97.72	54.9	309.03	59.9	977.24	64.9	3090.30

PRELIMINARY

Appendix E - ARFCN Frequencies

E-1. GSM-1900 ARFCN Frequencies

This subsection includes the following GSM-1900 ARFCN tables:

GSM-1900 A-Band ARFCN - Frequency (in MHz) Table E-1

GSM-1900 D-Band ARFCN - Frequency (in MHz) Table E-2

GSM-1900 B-Band ARFCN - Frequency (in MHz) Table E-3

GSM-1900 E-Band ARFCN - Frequency (in MHz) Table E-4

GSM-1900 F-Band ARFCN - Frequency (in MHz) Table E-5

GSM-1900 C-Band ARFCN - Frequency (in MHz) Table E-6

Table E-1 GSM-1900 A-Band ARFCN - Frequency (in MHz)

ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT
512	1850.2000	1930.2000	537	1855.2000	1935.2000	562	1860.2000	1940.2000
513	1850.4000	1930.4000	538	1855.4000	1935.4000	563	1860.4000	1940.4000
514	1850.6000	1930.6000	539	1855.6000	1935.6000	564	1860.6000	1940.6000
515	1850.8000	1930.8000	540	1855.8000	1935.8000	565	1860.8000	1940.8000
516	1851.0000	1931.0000	541	1856.0000	1936.0000	566	1861.0000	1941.0000
517	1851.2000	1931.2000	542	1856.2000	1936.2000	567	1861.2000	1941.2000
518	1851.4000	1931.4000	543	1856.4000	1936.4000	568	1861.4000	1941.4000
519	1851.6000	1931.6000	544	1856.6000	1936.6000	569	1861.6000	1941.6000
520	1851.8000	1931.8000	545	1856.8000	1936.8000	570	1861.8000	1941.8000
521	1852.0000	1932.0000	546	1857.0000	1937.0000	571	1862.0000	1942.0000
522	1852.2000	1932.2000	547	1857.2000	1937.2000	572	1862.2000	1942.2000
523	1852.4000	1932.4000	548	1857.4000	1937.4000	573	1862.4000	1942.4000
524	1852.6000	1932.6000	549	1857.6000	1937.6000	574	1862.6000	1942.6000
525	1852.8000	1932.8000	550	1857.8000	1937.8000	575	1862.8000	1942.8000
526	1853.0000	1933.0000	551	1858.0000	1938.0000	576	1863.0000	1943.0000
527	1853.2000	1933.2000	552	1858.2000	1938.2000	577	1863.2000	1943.2000
528	1853.4000	1933.4000	553	1858.4000	1938.4000	578	1863.4000	1943.4000
529	1853.6000	1933.6000	554	1858.6000	1938.6000	579	1863.6000	1943.6000
530	1853.8000	1933.8000	555	1858.8000	1938.8000	580	1863.8000	1943.8000
531	1854.0000	1934.0000	556	1859.0000	1939.0000	581	1864.0000	1944.0000
532	1854.2000	1934.2000	557	1859.2000	1939.2000	582	1864.2000	1944.2000
533	1854.4000	1934.4000	558	1859.4000	1939.4000	583	1864.4000	1944.4000
534	1854.6000	1934.6000	559	1859.6000	1939.6000	584	1864.6000	1944.6000
535	1854.8000	1934.8000	560	1859.8000	1939.8000	585	1864.8000	1944.8000
536	1855.0000	1935.0000	561	1860.0000	1940.0000	586	1865.0000	1945.0000

PRELIMINARY

Table E-2 GSM-1900 D-Band ARFCN - Frequency (in MHz)

ARFCN			ARFCN			ARFCN		
587	1865.2000	1945.2000	596	1867.0000	1947.0000	605	1868.8000	1948.8000
588	1865.4000	1945.4000	597	1867.2000	1947.2000	606	1869.0000	1949.0000
589	1865.6000	1945.6000	598	1867.4000	1947.4000	607	1869.2000	1949.2000
590	1865.8000	1945.8000	599	1867.6000	1947.6000	608	1869.4000	1949.4000
591	1866.0000	1946.0000	600	1867.8000	1947.8000	609	1869.6000	1949.6000
592	1866.2000	1946.2000	601	1868.0000	1948.0000	610	1869.8000	1949.8000
593	1866.4000	1946.4000	602	1868.2000	1948.2000	611	1870.0000	1950.0000
594	1866.6000	1946.6000	603	1868.4000	1948.4000			
595	1866.8000	1946.8000	604	1868.6000	1948.6000			

Table E-3 GSM-1900 B-Band ARFCN - Frequency (in MHz)

ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT
612	1870.2000	1950.2000	637	1875.2000	1955.2000	662	1880.2000	1960.2000
613	1870.4000	1950.4000	638	1875.4000	1955.4000	663	1880.4000	1960.4000
614	1870.6000	1950.6000	639	1875.6000	1955.6000	664	1880.6000	1960.6000
615	1870.8000	1950.8000	640	1875.8000	1955.8000	665	1880.8000	1960.8000
616	1871.0000	1951.0000	641	1876.0000	1956.0000	666	1881.0000	1961.0000
617	1871.2000	1951.2000	642	1876.2000	1956.2000	667	1881.2000	1961.2000
618	1871.4000	1951.4000	643	1876.4000	1956.4000	668	1881.4000	1961.4000
619	1871.6000	1951.6000	644	1876.6000	1956.6000	669	1881.6000	1961.6000
620	1871.8000	1951.8000	645	1876.8000	1956.8000	670	1881.8000	1961.8000
621	1872.0000	1952.0000	646	1877.0000	1957.0000	671	1882.0000	1962.0000
622	1872.2000	1952.2000	647	1877.2000	1957.2000	672	1882.2000	1962.2000
623	1872.4000	1952.4000	648	1877.4000	1957.4000	673	1882.4000	1962.4000
624	1872.6000	1952.6000	649	1877.6000	1957.6000	674	1882.6000	1962.6000
625	1872.8000	1952.8000	650	1877.8000	1957.8000	675	1882.8000	1962.8000
626	1873.0000	1953.0000	651	1878.0000	1958.0000	676	1883.0000	1963.0000
627	1873.2000	1953.2000	652	1878.2000	1958.2000	677	1883.2000	1963.2000
628	1873.4000	1953.4000	653	1878.4000	1958.4000	678	1883.4000	1963.4000
629	1873.6000	1953.6000	654	1878.6000	1958.6000	679	1883.6000	1963.6000
630	1873.8000	1953.8000	655	1878.8000	1958.8000	680	1883.8000	1963.8000
631	1874.0000	1954.0000	656	1879.0000	1959.0000	681	1884.0000	1964.0000
632	1874.2000	1954.2000	657	1879.2000	1959.2000	682	1884.2000	1964.2000
633	1874.4000	1954.4000	658	1879.4000	1959.4000	683	1884.4000	1964.4000
634	1874.6000	1954.6000	659	1879.6000	1959.6000	684	1884.6000	1964.6000
635	1874.8000	1954.8000	660	1879.8000	1959.8000	685	1884.8000	1964.8000
636	1875.0000	1955.0000	661	1880.0000	1960.0000	686	1885.0000	1965.0000

PRELIMINARY

Table E-4 GSM-1900 E-Band ARFCN - Frequency (in MHz)

ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT
687	1885.2000	1965.2000	696	1887.0000	1967.0000	705	1888.8000	1968.8000
688	1885.4000	1965.4000	697	1887.2000	1967.2000	706	1889.0000	1969.0000
689	1885.6000	1965.6000	698	1887.4000	1967.4000	707	1889.2000	1969.2000
690	1885.8000	1965.8000	699	1887.6000	1967.6000	708	1889.4000	1969.4000
691	1886.0000	1966.0000	700	1887.8000	1967.8000	709	1889.6000	1969.6000
692	1886.2000	1966.2000	701	1888.0000	1968.0000	710	1889.8000	1969.8000
693	1886.4000	1966.4000	702	1888.2000	1968.2000	711	1890.0000	1970.0000
694	1886.6000	1966.6000	703	1888.4000	1968.4000			
695	1886.8000	1966.8000	704	1888.6000	1968.6000			

Table E-5 GSM-1900 F-Band ARFCN - Frequency (in MHz)

ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT
712	1890.2000	1970.2000	721	1892.0000	1972.0000	730	1893.8000	1973.8000
713	1890.4000	1970.4000	722	1892.2000	1972.2000	731	1894.0000	1974.0000
714	1890.6000	1970.6000	723	1892.4000	1972.4000	732	1894.2000	1974.2000
715	1890.8000	1970.8000	724	1892.6000	1972.6000	733	1894.4000	1974.4000
716	1891.0000	1971.0000	725	1892.8000	1972.8000	734	1894.6000	1974.6000
717	1891.2000	1971.2000	726	1893.0000	1973.0000	735	1894.8000	1974.8000
718	1891.4000	1971.4000	727	1893.2000	1973.2000	736	1895.0000	1975.0000
719	1891.6000	1971.6000	728	1893.4000	1973.4000			
720	1891.8000	1971.8000	729	1893.6000	1973.6000			

Table E-6 GSM-1900 C-Band ARFCN - Frequency (in MHz)

ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT
737	1895.2000	1975.2000	762	1900.2000	1980.2000	787	1905.2000	1985.2000
738	1895.4000	1975.4000	763	1900.4000	1980.4000	788	1905.4000	1985.4000
739	1895.6000	1975.6000	764	1900.6000	1980.6000	789	1905.6000	1985.6000
740	1895.8000	1975.8000	765	1900.8000	1980.8000	790	1905.8000	1985.8000
741	1896.0000	1976.0000	766	1901.0000	1981.0000	791	1906.0000	1986.0000
742	1896.2000	1976.2000	767	1901.2000	1981.2000	792	1906.2000	1986.2000
743	1896.4000	1976.4000	768	1901.4000	1981.4000	793	1906.4000	1986.4000
744	1896.6000	1976.6000	769	1901.6000	1981.6000	794	1906.6000	1986.6000
745	1896.8000	1976.8000	770	1901.8000	1981.8000	795	1906.8000	1986.8000
746	1897.0000	1977.0000	771	1902.0000	1982.0000	796	1907.0000	1987.0000
747	1897.2000	1977.2000	772	1902.2000	1982.2000	797	1907.2000	1987.2000
748	1897.4000	1977.4000	773	1902.4000	1982.4000	798	1907.4000	1987.4000
749	1897.6000	1977.6000	774	1902.6000	1982.6000	799	1907.6000	1987.6000
750	1897.8000	1977.8000	775	1902.8000	1982.8000	800	1907.8000	1987.8000
751	1898.0000	1978.0000	776	1903.0000	1983.0000	801	1908.0000	1988.0000

PRELIMINARY

ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT	ARFCN	RECEIVE	TRANSMIT
752	1898.2000	1978.2000	777	1903.2000	1983.2000	802	1908.2000	1988.2000
753	1898.4000	1978.4000	778	1903.4000	1983.4000	803	1908.4000	1988.4000
754	1898.6000	1978.6000	779	1903.6000	1983.6000	804	1908.6000	1988.6000
755	1898.8000	1978.8000	780	1903.8000	1983.8000	805	1908.8000	1988.8000
756	1899.0000	1979.0000	781	1904.0000	1984.0000	806	1909.0000	1989.0000
757	1899.2000	1979.2000	782	1904.2000	1984.2000	807	1909.2000	1989.2000
758	1899.4000	1979.4000	783	1904.4000	1984.4000	808	1909.4000	1989.4000
759	1899.6000	1979.6000	784	1904.6000	1984.6000	809	1909.6000	1989.6000
760	1899.8000	1979.8000	785	1904.8000	1984.8000	810	1909.8000	1989.8000
761	1900.0000	1980.0000	786	1905.0000	1985.0000			

PRELIMINARY

E-2. E-GSM-900 ARFCN Frequencies (in MHz)

Table E-7 E-GSM-900 ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
0	890.000	935.000	30	896.000	941.000	60	902.000	947.000
1	890.200	935.200	31	896.200	941.200	61	902.200	947.200
2	890.400	935.400	32	896.400	941.400	62	902.400	947.400
3	890.600	935.600	33	896.600	941.600	63	902.600	947.600
4	890.800	935.800	34	896.800	941.800	64	902.800	947.800
5	891.000	936.000	35	897.000	942.000	65	903.000	948.000
6	891.200	936.200	36	897.200	942.200	66	903.200	948.200
7	891.400	936.400	37	897.400	942.400	67	903.400	948.400
8	891.600	936.600	38	897.600	942.600	68	903.600	948.600
9	891.800	936.800	39	897.800	942.800	69	903.800	948.800
10	892.000	937.000	40	898.000	943.000	70	904.000	949.000
11	892.200	937.200	41	898.200	943.200	71	904.200	949.200
12	892.400	937.400	42	898.400	943.400	72	904.400	949.400
13	892.600	937.600	43	898.600	943.600	73	904.600	949.600
14	892.800	937.800	44	898.800	943.800	74	904.800	949.800
15	893.000	938.000	45	899.000	944.000	75	905.000	950.000
16	893.200	938.200	46	899.200	944.200	76	905.200	950.200
17	893.400	938.400	47	899.400	944.400	77	905.400	950.400
18	893.600	938.600	48	899.600	944.600	78	905.600	950.600
19	893.800	938.800	49	899.800	944.800	79	905.800	950.800
20	894.000	939.000	50	900.000	945.000	80	906.000	951.000
21	894.200	939.200	51	900.200	945.200	81	906.200	951.200
22	894.400	939.400	52	900.400	945.400	82	906.400	951.400
23	894.600	939.600	53	900.600	945.600	83	906.600	951.600
24	894.800	939.800	54	900.800	945.800	84	906.800	951.800
25	895.000	940.000	55	901.000	946.000	85	907.000	952.000
26	895.200	940.200	56	901.200	946.200	86	907.200	952.200
27	895.400	940.400	57	901.400	946.400	87	907.400	952.400
28	895.600	940.600	58	901.600	946.600	88	907.600	952.600
29	895.800	940.800	59	901.800	946.800	89	907.800	952.800
						90	908.000	953.000

PRELIMINARY

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
91	908.200	953.200	103	910.600	955.600	115	913.000	958.000
92	908.400	953.400	104	910.800	955.800	116	913.200	958.200
93	908.600	953.600	105	911.000	956.000	117	913.400	958.400
94	908.800	953.800	106	911.200	956.200	118	913.600	958.600
95	909.000	954.000	107	911.400	956.400	119	913.800	958.800
96	909.200	954.200	108	911.600	956.600	120	914.000	959.000
97	909.400	954.400	109	911.800	956.800	121	914.200	959.200
98	909.600	954.600	110	912.000	957.000	122	914.400	959.400
99	909.800	954.800	111	912.200	957.200	123	914.600	959.600
100	910.000	955.000	112	912.400	957.400	124	914.800	959.800
101	910.200	955.200	113	912.600	957.600			
102	910.400	955.400	114	912.800	957.800			

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
975	880.200	925.200	992	883.600	928.600	1009	887.000	932.000
976	880.400	925.400	993	883.800	928.800	1010	887.200	932.200
977	880.600	925.600	994	884.000	929.000	1011	887.400	932.400
978	880.800	925.800	995	884.200	929.200	1012	887.600	932.600
979	881.000	926.000	996	884.400	929.400	1013	887.800	932.800
980	881.200	926.200	997	884.600	929.600	1014	888.000	933.000
981	881.400	926.400	998	884.800	929.800	1015	888.200	933.200
982	881.600	926.600	999	885.000	930.000	1016	888.400	933.400
983	881.800	926.800	1000	885.200	930.200	1017	888.600	933.600
984	882.000	927.000	1001	885.400	930.400	1018	888.800	933.800
985	882.200	927.200	1002	885.600	930.600	1019	889.000	934.000
986	882.400	927.400	1003	885.800	930.800	1020	889.200	934.200
987	882.600	927.600	1004	886.000	931.000	1021	889.400	934.400
988	882.800	927.800	1005	886.200	931.200	1022	889.600	934.600
989	883.000	928.000	1006	886.400	931.400	1023	889.800	934.800
990	883.200	928.200	1007	886.600	931.600			
991	883.400	928.400	1008	886.800	931.800			

PRELIMINARY

E-3. GSM-850 ARFCN Frequencies (in MHz)

Table E-8 GSM-850 A-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
128	824.200	869.200	146	827.800	872.800	164	831.400	876.400
129	824.400	869.400	147	828.000	873.000	165	831.600	876.600
130	824.600	869.600	148	828.200	873.200	166	831.800	876.800
131	824.800	869.800	149	828.400	873.400	167	832.000	877.000
132	825.000	870.000	150	828.600	873.600	168	832.200	877.200
133	825.200	870.200	151	828.800	873.800	169	832.400	877.400
134	825.400	870.400	152	829.000	874.000	170	832.600	877.600
135	825.600	870.600	153	829.200	874.200	171	832.800	877.800
136	825.800	870.800	154	829.400	874.400	172	833.000	878.000
137	826.000	871.000	155	829.600	874.600	173	833.200	878.200
138	826.200	871.200	156	829.800	874.800	174	833.400	878.400
139	826.400	871.400	157	830.000	875.000	175	833.600	878.600
140	826.600	871.600	158	830.200	875.200	176	833.800	878.800
141	826.800	871.800	159	830.400	875.400	177	834.000	879.000
142	827.000	872.000	160	830.600	875.600	178	834.200	879.200
143	827.200	872.200	161	830.800	875.800	179	834.400	879.400
144	827.400	872.400	162	831.000	876.000	180	834.600	879.600
145	827.600	872.600	163	831.200	876.200	181	834.800	879.800

Table E-9 GSM-850 B-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
183	835.200	880.200	199	838.400	883.400	215	842.600	886.600
184	835.400	880.400	200	838.600	883.600	216	842.800	886.800
185	835.600	880.600	201	838.800	883.800	217	843.000	887.000
186	835.800	880.800	202	839.000	884.000	218	843.200	887.200
187	836.000	881.000	203	839.200	884.200	219	843.400	887.400
188	836.200	881.200	204	839.400	884.400	220	843.600	887.600
189	836.400	881.400	205	839.600	884.600	221	843.800	887.800
190	836.600	881.600	206	839.800	884.800	222	844.000	888.000
191	836.800	881.800	207	840.000	885.000	223	844.200	888.200
192	837.000	882.000	208	841.200	885.200	224	844.400	888.400
193	837.200	882.200	209	841.400	885.400	225	844.600	888.600
194	837.400	882.400	210	841.600	885.600	226	844.800	888.800
195	837.600	882.600	211	841.800	885.800	227	845.000	889.000
196	837.800	882.800	212	842.000	886.000	228	845.200	889.200
197	838.000	883.000	213	842.200	886.200	229	845.400	889.400
198	838.200	883.200	214	842.400	886.400	230	845.600	889.600
						231	845.800	889.800

PRELIMINARY

Table E-10 GSM-850 A-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
233	845.200	890.200	235	845.600	890.600	237	846.000	891.000
234	845.400	890.400	236	845.800	890.800	238	846.200	891.200
						239	846.400	891.400

Table E-11 GSM-850 B-Band ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
240	846.600	891.600	244	847.400	892.400	248	848.200	893.200
241	846.800	891.800	245	847.600	892.600	249	848.400	893.400
242	847.000	892.000	246	847.800	892.800	250	848.600	894.600
243	847.200	892.200	247	848.000	893.000	251	848.800	895.800

PRELIMINARY

E-4. GSM-1800 ARFCN Frequencies (in MHz)

Table E-12 E-GSM-1800 ARFCN - Frequency (in MHz)

ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
512	1710.200	1805.200	552	1718.200	1813.200	592	1726.200	1821.200
513	1710.400	1805.400	553	1718.400	1813.400	593	1726.400	1821.400
514	1710.600	1805.600	554	1718.600	1813.600	594	1726.600	1821.600
515	1710.800	1805.800	555	1718.800	1813.800	595	1726.800	1821.800
516	1711.000	1805.000	556	1719.000	1814.000	596	1727.000	1822.000
517	1711.200	1805.200	557	1719.200	1814.200	597	1727.200	1822.200
518	1711.400	1805.400	558	1719.400	1814.400	598	1727.400	1822.400
519	1711.600	1805.600	559	1719.600	1814.600	599	1727.600	1822.600
520	1711.800	1805.800	560	1719.800	1814.800	600	1727.800	1822.800
521	1712.000	1805.000	561	1720.000	1815.000	601	1728.000	1823.000
522	1712.200	1805.200	562	1720.200	1815.200	602	1728.200	1823.200
523	1712.400	1805.400	563	1720.400	1815.400	603	1728.400	1823.400
524	1712.600	1805.600	564	1720.600	1815.600	604	1728.600	1823.600
525	1712.800	1805.800	565	1720.800	1815.800	605	1728.800	1823.800
526	1713.000	1805.000	566	1721.000	1816.000	606	1729.000	1824.000
527	1713.200	1805.200	567	1721.200	1816.200	607	1729.200	1824.200
528	1713.400	1805.400	568	1721.400	1816.400	608	1729.400	1824.400
529	1713.600	1805.600	569	1721.600	1816.600	609	1729.600	1824.600
530	1713.800	1805.800	570	1721.800	1816.800	610	1729.800	1824.800
531	1714.000	1805.000	571	1722.000	1817.000	611	1730.000	1825.000
532	1714.200	1805.200	572	1722.200	1817.200	612	1730.200	1825.200
533	1714.400	1805.400	573	1722.400	1817.400	613	1730.400	1825.400
534	1714.600	1805.600	574	1722.600	1817.600	614	1730.600	1825.600
535	1714.800	1805.800	575	1722.800	1817.800	615	1730.800	1825.800
536	1715.000	1805.000	576	1723.000	1818.000	616	1731.000	1826.000
537	1715.200	1805.200	577	1723.200	1818.200	617	1731.200	1826.200
538	1715.400	1805.400	578	1723.400	1818.400	618	1731.400	1826.400
539	1715.600	1805.600	579	1723.600	1818.600	619	1731.600	1826.600
540	1715.800	1805.800	580	1723.800	1818.800	620	1731.800	1826.800
541	1716.000	1805.000	581	1724.000	1819.000	621	1732.000	1827.000
542	1716.200	1805.200	582	1724.200	1819.200	622	1732.200	1827.200
543	1716.400	1805.400	583	1724.400	1819.400	623	1732.400	1827.400
544	1716.600	1805.600	584	1724.600	1819.600	624	1732.600	1827.600
545	1716.800	1805.800	585	1724.800	1819.800	625	1732.800	1827.800
546	1717.000	1805.000	586	1725.000	1820.000	626	1733.000	1828.000
547	1717.200	1805.200	587	1725.200	1820.200	627	1733.200	1828.200
548	1717.400	1805.400	588	1725.400	1820.400	628	1733.400	1828.400
549	1717.600	1805.600	589	1725.600	1820.600	629	1733.600	1828.600
550	1717.800	1805.800	590	1725.800	1820.800	630	1733.800	1828.800
551	1718.000	1813.000	591	1726.000	1821.000	631	1734.000	1829.000

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ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
632	1734.200	1829.200	675	1742.800	1837.800	718	1751.400	1846.400
633	1734.400	1829.400	676	1743.000	1838.000	719	1751.600	1846.600
634	1734.600	1829.600	677	1743.200	1838.200	720	1751.800	1846.800
635	1734.800	1829.800	678	1743.400	1838.400	721	1752.000	1847.000
636	1735.000	1830.000	679	1743.600	1838.600	722	1752.200	1847.200
637	1735.200	1830.200	680	1743.800	1838.800	723	1752.400	1847.400
638	1735.400	1830.400	681	1744.000	1839.000	724	1752.600	1847.600
639	1735.600	1830.600	682	1744.200	1839.200	725	1752.800	1847.800
640	1735.800	1830.800	683	1744.400	1839.400	726	1753.000	1848.000
641	1736.000	1831.000	684	1744.600	1839.600	727	1753.200	1848.200
642	1736.200	1831.200	685	1744.800	1839.800	728	1753.400	1848.400
643	1736.400	1831.400	686	1745.000	1840.000	729	1753.600	1848.600
644	1736.600	1831.600	687	1745.200	1840.200	730	1753.800	1848.800
645	1736.800	1831.800	688	1745.400	1840.400	731	1754.000	1849.000
646	1737.000	1832.000	689	1745.600	1840.600	732	1754.200	1849.200
647	1737.200	1832.200	690	1745.800	1840.800	733	1754.400	1849.400
648	1737.400	1832.400	691	1746.000	1841.000	734	1754.600	1849.600
649	1737.600	1832.600	692	1746.200	1841.200	735	1754.800	1849.800
650	1737.800	1832.800	693	1746.400	1841.400	736	1755.000	1850.000
651	1738.000	1833.000	694	1746.600	1841.600	737	1755.200	1850.200
652	1738.200	1833.200	695	1746.800	1841.800	738	1755.400	1850.400
653	1738.400	1833.400	696	1747.000	1842.000	739	1755.600	1850.600
654	1738.600	1833.600	697	1747.200	1842.200	740	1755.800	1850.800
655	1738.800	1833.800	698	1747.400	1842.400	741	1756.000	1851.000
656	1739.000	1834.000	699	1747.600	1842.600	742	1756.200	1851.200
657	1739.200	1834.200	700	1747.800	1842.800	743	1756.400	1851.400
658	1739.400	1834.400	701	1748.000	1843.000	744	1756.600	1851.600
659	1739.600	1834.600	702	1748.200	1843.200	745	1756.800	1851.800
660	1739.800	1834.800	703	1748.400	1843.400	746	1757.000	1852.000
661	1740.000	1835.000	704	1748.600	1843.600	747	1757.200	1852.200
662	1740.200	1835.200	705	1748.800	1843.800	748	1757.400	1852.400
663	1740.400	1835.400	706	1749.000	1844.000	749	1757.600	1852.600
664	1740.600	1835.600	707	1749.200	1844.200	750	1757.800	1852.800
665	1740.800	1835.800	708	1749.400	1844.400	751	1758.000	1853.000
666	1741.000	1836.000	709	1749.600	1844.600	752	1758.200	1853.200
667	1741.200	1836.200	710	1749.800	1844.800	753	1758.400	1853.400
668	1741.400	1836.400	711	1750.000	1845.000	754	1758.600	1853.600
669	1741.600	1836.600	712	1750.200	1845.200	755	1758.800	1853.800
670	1741.800	1836.800	713	1750.400	1845.400	756	1759.000	1854.000
671	1742.000	1837.000	714	1750.600	1845.600	757	1759.200	1854.200
672	1742.200	1837.200	715	1750.800	1845.800	758	1759.400	1854.400
673	1742.400	1837.400	716	1751.000	1846.000	759	1759.600	1854.600
674	1742.600	1837.600	717	1751.200	1846.200	760	1759.800	1854.800

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ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK	ARFCN	UPLINK	DOWNLINK
761	1760.000	1855.000	802	1768.200	1863.200	844	1776.600	1871.600
762	1760.200	1855.200	803	1768.400	1863.400	845	1776.800	1871.800
763	1760.400	1855.400	804	1768.600	1863.600	846	1777.000	1872.000
764	1760.600	1855.600	805	1768.800	1863.800	847	1777.200	1872.200
765	1760.800	1855.800	806	1769.000	1864.000	848	1777.400	1872.400
766	1761.000	1856.000	807	1769.200	1864.200	849	1777.600	1872.600
767	1761.200	1856.200	808	1769.400	1864.400	850	1777.800	1872.800
768	1761.400	1856.400	809	1769.600	1864.600	851	1778.000	1873.000
769	1761.600	1856.600	810	1769.800	1864.800	852	1778.200	1873.200
770	1761.800	1856.800	811	1770.000	1865.000	853	1778.400	1873.400
771	1762.000	1857.000	812	1770.200	1865.200	854	1778.600	1873.600
772	1762.200	1857.200	813	1770.400	1865.400	855	1778.800	1873.800
773	1762.400	1857.400	814	1770.600	1865.600	856	1779.000	1874.000
774	1762.600	1857.600	815	1770.800	1865.800	857	1779.200	1874.200
775	1762.800	1857.800	816	1771.000	1866.000	858	1779.400	1874.400
776	1763.000	1858.000	817	1771.200	1866.200	859	1779.600	1874.600
777	1763.200	1858.200	818	1771.400	1866.400	860	1779.800	1874.800
778	1763.400	1858.400	819	1771.600	1866.600	861	1780.000	1875.000
779	1763.600	1858.600	820	1771.800	1866.800	862	1780.200	1875.200
780	1763.800	1858.800	821	1772.000	1867.000	863	1780.400	1875.400
781	1764.000	1859.000	822	1772.200	1867.200	864	1780.600	1875.600
782	1764.200	1859.200	823	1772.400	1867.400	865	1780.800	1875.800
783	1764.400	1859.400	824	1772.600	1867.600	866	1781.000	1876.000
784	1764.600	1859.600	825	1772.800	1867.800	867	1781.200	1876.200
785	1764.800	1859.800	826	1773.000	1868.000	868	1781.400	1876.400
786	1765.000	1860.000	827	1773.200	1868.200	869	1781.600	1876.600
787	1765.200	1860.200	828	1773.400	1868.400	870	1781.800	1876.800
788	1765.400	1860.400	829	1773.600	1868.600	871	1782.000	1877.000
789	1765.600	1860.600	830	1773.800	1868.800	872	1782.200	1877.200
790	1765.800	1860.800	831	1774.000	1869.000	873	1782.400	1877.400
791	1766.000	1861.000	832	1774.200	1869.200	874	1782.600	1877.600
792	1766.200	1861.200	833	1774.400	1869.400	875	1782.800	1877.800
793	1766.400	1861.400	834	1774.600	1869.600	876	1783.000	1878.000
794	1766.600	1861.600	835	1774.800	1869.800	877	1783.200	1878.200
795	1766.800	1861.800	836	1775.000	1870.000	878	1783.400	1878.400
796	1767.000	1862.000	837	1775.200	1870.200	879	1783.600	1878.600
797	1767.200	1862.200	838	1775.400	1870.400	880	1783.800	1878.800
798	1767.400	1862.400	839	1775.600	1871.600	881	1784.000	1879.000
799	1767.600	1862.600	840	1775.800	1871.800	882	1784.200	1879.200
800	1767.800	1862.800	841	1776.000	1871.000	883	1784.400	1879.400
801	1768.000	1863.000	842	1776.200	1871.200	884	1784.600	1879.600
			843	1776.400	1871.400	885	1784.800	1879.800

PRELIMINARY

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Appendix F – BTS-4000RM Technical Specifications

Environmental	
Ambient Temperature (Operating)	0° C to +40° C (32° F to +104° F)
Ambient Temperature (Non-Operating)	-40° C to +85° C (-40° F to +185° F)
Maximum Temperature Variation:	8.3° C per hour (14.94° F per hour)
Relative Humidity (Operating)	5% to 95%, non-condensing
Relative Humidity (Non-Operating)	5% to 95%, non-condensing
Elevation (Operating)	-60 to 3962.4 meters (-200 to 13000 feet) above sea level
Elevation (Non-Operating)	-60 to 12192 meters (-200 to 40000 feet) above sea level

Power	
Nominal Input Voltage:	+27VDC
Input Voltage Range:	+22VDC to +30VDC
Power Consumption:	BPU: 250 Watts
	HPA: 750 Watts
	If AC to DC power supply used, 1100 Watts apparent power required at the AC outlet.
Input Current (at max HPA output 63W)	+24VDC: BPU = 7.8 Amps, HPA = 26.0 Amps 110VAC: 9.9 Amps

RF	
Number of RF Carriers:	1 to 4 simultaneous GSM RF carriers
Channels per RF Carrier	8 channels per RF carrier (up to 32 simultaneous channels)
Mobile-to-Mobile Connections	7 to 30 traffic channels (15 simultaneous mobile-to-mobile connections)
Air Interface:	GSM-850, GSM-900, GSM-1800, or PCS-1900
Receive Sensitivity	-110 dBm (Typical)
Transmit Power	HPA: up to 50 Watts per RF Carrier. Without HPA: 0.7 mWatts per RF Carrier

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Physical	
Dimensions	BPU: 3.5" H (2U) x 19" W x 24" D (8.89 cm H x 48.26cm W x 60.96 cm D) HPA: x 5.25" H (3U) x 19" W x 24" D (13.34cm H x 48.26cm W x 60.96cm D)
Weight:	BPU: 29 lbs. (13.16 kgs) HPA: 42 lbs. (19.06 kgs)
Airflow:	BPU: From right to left (facing the front of the unit) HPA: From front to back
External Connections (at the HPA I/O Panel)	
FAN I/O	DB9F
RS-422	DB9F
RF IN	SMA, RF
RF OUT	SMA, RF
External Connections (at the BPU I/O Panels)	
T1/E1-A and T1/E1-B	RJ45, 8-pin
Ethernet	RJ-45, 8-pin
12 VDC	Not used in a rack-mounted configuration.
TMA	DB9F
HPA FAN I/O	DB9F
HPA RS-422	DB9F, RS-422
TX OUT	SMA, RF
TX IN	SMA, RF
TX MON	SMA, RF
ANT RX2	N-Type coaxial
ANT TX/RX1	N-Type coaxial
Serial Port (front of ICE-T module)	RJ-45, RS-232

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Appendix G

Return Material Authorization (RMA) Procedure

G.1. INTRODUCTION

AirNet will ensure replacement of non-conforming components that affect a system's performance. All returned components that require such replacement or repair should arise solely from normal and customary use as described in the AirNet Installation and Maintenance manuals.

G.2. RETURN PROCESS

G.2.1 Request an RMA Number

After the first level of troubleshooting is complete, and the module is alleged to be nonconforming, as indicated by the AirNet Maintenance manuals, a call should be placed to the Customer Response Center for pre-approval to return the material. The CRC representative will request the following information pertaining to the replacement:

- a. Customer's name and address
- b. Field engineer's name (contact for further information)
- c. Site name
- d. Part name\Part number\Part serial number
- e. Detailed explanation of the symptoms and conditions leading to the diagnosis\replacement of the suspect module
- f. Equipment type housing the failed component and slot position (if applicable)

A member of AirNet management reviews items A through F above and determines authorization for the return using their knowledge and product expertise. If the return is authorized, an RMA number is assigned.

Note: Consumable items are not classified as field replaceable units (i.e. batteries, surge arrestors, air filters, etc.), as referenced in the AirNet Maintenance manuals. It is the Customer's responsibility to assume the replacement expense of these materials.

G.2.2 Use Proper Packing

Proper packing is required when returning material to AirNet, as explained in Section G.3. AirNet recommends reusing the original packing material in which the equipment/module was shipped. In the event the original packing material is not available, AirNet can provide a sturdy packing material return kit for that item at an additional small fee. If the material is damaged in transit, the RMA may be rejected as explained in Section G.4.

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G.2.3 Return the Material Within 30 Days

The Customer must ship the material to AirNet within 30 days of the return authorization approval date. Any material that is not received by AirNet after 40 days (allowing shipping time), will be invoiced for the price of the material. AirNet also reserves the right to not process further RMAs until this overdue material is reconciled.

Return the material to the following specified address:

RMA # (insert the RMA number here)
AirNet Communications
295 North Drive, Suite E
Melbourne, FL 32934

G.2.4 Write the RMA Number on the Package and the Carrier's Bill of Lading

When returning material to AirNet, the Customer must visibly write the assigned RMA number on the outside of the package and in the reference field section on the carrier's Bill of Lading. This allows AirNet to associate the shipment with the RMA and reference the correct RMA number in the customer's invoice.

- If using **DHL** shipping, please include the RMA number in the field labeled "**Shipper's Reference**".
- If using **FedEx** shipping, please include the RMA number in the field labeled "**Your Internal Billing Reference**".
- If using **UPS** shipping, please include the RMA number in the field labeled "**Reference Number**".
- If using a different shipping carrier, please include the RMA number in a prominent location/field on the carrier's Bill of Lading.

Failure to include the RMA number on the carrier's Bill of Lading relieves AirNet of any responsibility for lost material.

G.3. PROPER HANDLING AND PACKING

G.3.1 Instructions

The proper packing of electronic materials is important. ***Electronic parts and devices are highly susceptible to damage from electrostatic discharge, humidity, dust, temperature, and other environmental conditions.*** Additional exposure to these conditions or handling the material improperly can further damage and degrade the component until failure occurs.

When handling modules (such as when replacing suspect components in the equipment), ensure that you are properly grounded – using the grounding wrist strap attached to the inside of every cabinet.

Note: As a general rule, modules that are not inserted in the equipment must be stored in electrostatic protective bags, and packed inside a box.

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To protect the materials from mechanical failure or damage due to normal physical shock that occurs during transport, the steps in Section G.3.2 should be taken prior to moving materials to ensure they will arrive safely at their destination.

G.3.2 Packing/Shipping Preparation

The original packing materials in which the equipment/module was shipped is the best choice. The rigid Styrofoam packing material will hold the item securely in place. Modules and electronic assemblies must be packed separately using ESD packing materials. To meet these requirements, AirNet ships all items in the appropriate packaging, which can also be used for returns. In the event the original packaging is not available, AirNet can provide a sturdy packing material return kit for that item at an additional small fee.

To protect material from deterioration and/or damage, assemble the items into unit packs and intermediate or exterior containers, with the necessary barrier material, bracing, cushioning, weatherproofing, and reinforcing or application of various protective measures.

Without exception, all printed circuit boards and electronic assemblies must be shipped in an ESD bag.

Use an exterior container/box that meets carrier regulations and is of sufficient strength, by reason of material, design, and construction, to be shipped safely without further packaging (e.g., wooden boxes or crates, fiber and metal drums, and corrugated and solid fiberboard boxes).

All packaging material must provide protection for the product from, but not limited to:

- damage by abrasion
- moisture that could damage the product
- ancillary hardware loss during shipment
- package bursting from inertia or weight
- ESD

All packing material must ensure safe handling, shipping, and storage of the product.

Caution markings must be applied as required (e.g., FRAGILE, arrows, hazardous warning labels, etc.).

AirNet will not accept liability for damage to items attributable to the customer improperly packaging the equipment/module.

G.4. RMA REJECTION

AirNet will physically inspect and test all authorized material returns against the assigned RMA number and reserves the right to reject the received RMA and invoice the Customer, if the materials are found to be:

1. Damaged in transit - This can result from improper packaging by the Customer for return to AirNet.
2. Altered in a manner not specified by AirNet documentation - This includes any unauthorized repair, such as, drilled holes, application of seal/paste compounds, or the modification, removal, or obliteration of the barcode, serial number, or other identifying mark, etc.

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3. Mishandled by the Customer - AirNet documentation requires the use of proper tools, such as an ESD strap. Inappropriate and unconventional installation not specified by AirNet documentation can produce adverse stress on the materials and result in fractured, burned, or degraded parts.
4. Mismanaged Materials - This refers to the misplacement of material in an unwarranted environment (i.e., material left in the rain, snow, humidity, etc.), maltreatment of stored materials by the Customer, or vandalism.

Note: If an outdoor enclosure must be stored for a period exceeding 15 days, it must be removed from exposure to external elements (rain, sleet, snow, etc.), unless the unit's environmental control system is operational (fans and air conditioner). Indoor enclosures shall only be stored in controlled environments.

5. Damaged by Improper Operating Environmental Conditions - This refers to the Customer's failure to maintain proper operating environmental conditions or external electrical parameters (i.e., faulty generators or power lines), according to the Technical Specifications of the product. Such conditions cannot be used to support AirNet network equipment and will inflict damage to the material.
6. Damaged by Force Majeure - This refers to any materials impacted by an unforeseen natural occurrence, such as lightning strikes, floods, power outages, etc.

In the event that an RMA is rejected, the customer will be invoiced for the price of the material/unit. A CRC representative will inform the customer that the RMA was rejected, the reasons for the decision, and the proper action.

G.5. ADDITIONAL INFORMATION

For more information or clarification of this RMA procedure, please contact a CRC representative.

PRELIMINARY

Appendix H - Ancillary Equipment

H.1. DC Circuit Breaker Panel



DPB1U SERIES CIRCUIT BREAKER PANELS

DESCRIPTION

Unipower Telecom's DPB1U Series of circuit breaker panels provide distribution and overload protection for 2 to 12 DC circuits. The panels are only one mounting position (1.75 inches) high. The panel provides 1 to 6 single-bus breakers or 2 to 12 dual-bus (A&B) breakers (1 to 6 per bus). The panels distribute up to a total of 300 amperes of load current from a single or two separate 150-ampere sources with true A and B distribution and alarm capabilities. A and B sections of the dual-bus panel are isolated and can be separately configured for 12, 24 or 48 volts, positive or negative ground. Breaker capacities are from 1 to 50 amperes.

Breaker alarm is indicated by a dual-color LED (green/red) for each bus and two Form C relay contacts per bus.

A fail safe option lets the A and B sides operate redundantly from two separate feeds.

The panels come with brackets that permit mounting in either a 19- or 23-inch relay rack. They can be mounted from the front of the rack with offsets every quarter-inch front to back to align with existing rack-mounted equipment.

SAFETY CERTIFICATIONS

UL1950
CSA 22.2, No. 950
EN60-950

TWO-YEAR WARRANTY



DC DISTRIBUTION PANELS

MODEL	BUS	BREAKERS
DPB1U-A	SINGLE 150A	1-6
DPB1U-A-B	DUAL 150A	1-6 / 1-6

FEATURES

- ◆ One Mounting Position High: 1.75"
- ◆ 19- or 23-Inch Rack Mounting
- ◆ Magnetic Circuit Breakers
- ◆ Single Bus with 1 to 6 Breakers
- ◆ Dual Bus (A/B) with 2 to 12 Breakers
- ◆ Voltage: 12, 24 or 48VDC
- ◆ Positive or Negative Ground
- ◆ A & B are Isolated Loads
- ◆ A & B Can Be Separately Configured
- ◆ 1A to 50A per Breaker
- ◆ Bus Capacity: 150A per Bus
- ◆ Green/Red LED Breaker Alarm
- ◆ Two Form C Relay Contacts per Bus (A/B)
- ◆ Rack Offset Every 1/4" from Front to Back
- ◆ Fail Safe Option

www.unipowertelecom.com
954-346-2442

PRELIMINARY



SPECIFICATIONS, DPB1U SERIES

INPUT / OUTPUT

Panel Capacity	150A Per Bus, 300A Total
Configuration	Single Bus with 1 to 6 Breakers
Breaker Capacity ^a	Dual Bus with 1 to 6 Breakers Each
Voltage, 48V Version	1A to 50A
24V Version	42-60VDC
12V Version	21-30VDC
Polarity ^a	10.5-15VDC
	Positive or Negative Ground

ALARMS

Alarm Indicator	Dual-Color LED Per Bus
LED Status Indication	Green = Normal
	Red = Alarm
	Off = No Power
Alarm Connections	Two Form C Relay Contacts Per Bus

SAFETY STANDARDS

.....	UL1950, CSA22.2 No.950, EN60-950
-------	----------------------------------

ENVIRONMENTAL

Operating Temp. Range	-10°C to +70°C
Storage Temp. Range	-40°C to +85°C
Humidity	0% to 95%, Non-Condensing

PHYSICAL SPECIFICATIONS

Case Material	Steel
Finish	Powder Coat Gray
Dimensions, " Inches (mm)	1.75 H x 19.00 W x 9.00 D (44.5 x 483 x 229)
Weight	10.30 lbs. (4.67 kg.)
Rack Mounting Width	19 or 23 Inches

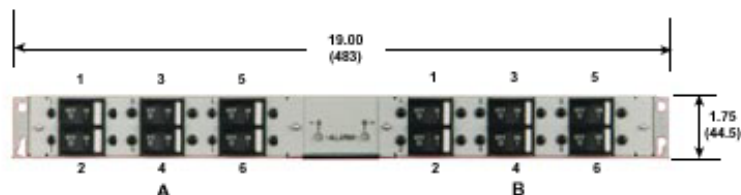
CONNECTIONS

Input Connections	Crimp Type Lug or 1/2" Studs
Output Connections, 1-30A	Barrier Term. Strips, No. 6-32
40-50A	Barrier Term. Strips, No. 10-32
Chassis Ground Connection	No. 8-32 Stud
Fail Alarm Connections	.045" sq. Wirewrap Pins

NOTES:

1. See table for breaker capacities.
2. See Ordering Guide to specify voltage and polarity.
3. For unit with fail safe option the case depth is 10.44 inches (265mm).

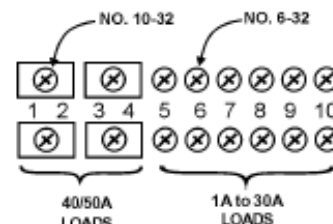
FRONT VIEW



REAR VIEW



CONNECTION FOR VARIOUS LOADS



Crimp Lugs should be ordered separately.
For a kit of 4 two-hole lugs for no. 6 AWG wire, order no. 775-1434-000, \$20.00.

ORDERING GUIDE

Model No.: DPB1U-A ☐ ☐ ☐ ☐ ☐ ☐ -B ☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐

CODE	VOLTAGE & POLARITY
1	-48V (Pos. Gnd.)
2	+48V (Neg. Gnd.)
3	-24V (Pos. Gnd.)
4	+24V (Neg. Gnd.)
5	-12V (Pos. Gnd.)
6	+12V (Neg. Gnd.)

STANDARD BREAKERS

CODE	AMPS
F	1
G	2.5
H	5
I	10
J	15
K	20
L	25
M	30
N	40
O	50

CODE	OPTION
F	Fail Safe*

* For 24 or 48V versions only. A & B sides must be identical in voltage and polarity.

CODE	OPTION
C	Rear Cover (Clear Plastic)

NOTE:

1. The sum of all breaker currents on either side (A or B) must not exceed the maximum bus current, 150A.
2. If section B is not used, blank front & rear panels are installed at the factory.

ALL DIMENSIONS IN INCHES (mm).
All specifications subject to change without notice.

dpb1u-revB-10-28-03.pdf

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PRELIMINARY

H.1. AC-to-DC Power Supply



R2250 FRONT END AC-DC POWER SHELF

AC Input: 85V to 264V AC
Output: 24V to 28.5V, 2250W

Product Specification

FEATURES

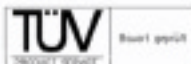
- ❑ Rack mount chassis (19", 1U high)
- ❑ 1U, 2U, 3U & 4U stackable for higher wattage power.
- ❑ Parallel operation which can house up to 3 x A0750 series power modules
- ❑ 1500W of N+1 Redundant operation
- ❑ Configurable local and remote sense of output bus voltage
- ❑ Power fail Warning & Fault Alarm
- ❑ Compatible with worldwide power sources. (Universal AC Input)
- ❑ I²C Optional
- ❑ Local and Remote Monitoring
- ❑ Hot Swap

The Powerstax R2250 series of front-end power shelves is designed to operate as a key element in a complete distributed power system.

The power shelf mates to a commercial power grid and when assembled with power modules, generates a precisely regulated 24 to 28.5VDC bus voltage.

This power shelf can house up to three Powerstax A0750 power modules and provides protection, and a number of alarm and control features. This product is intended for integration into end-use equipment.

The power shelf can supply up to 1500W of N+1 redundant power or up to 2250W of total power depending on configuration of power modules. Four stacked shelves can provide up to 9,000W total power.



RoHS 100%



R2250 FRONT END AC-DC POWER SHELF

AC Input: 85V to 264V DC
Output: 24V to 28.5V, 2250W

Product Specification



Input Connector

The R2250 series power shelves can be used with any standard global line voltages. The standard AC input connection to the shelf is through three IEC320 type connector rated at 10A / 250Vac in Europe/Asia and 15A / 120Vac in North America.

Output Connector

The shelf has two terminal blocks for DC output (each with three M4 screws). They are labelled V+ and V-, respectively, on the body of the terminal block. The V+ and V- are floating with respect to frame GND. Frame GND may be floated or connected to either bus depending upon the customer requirements for positive bus or negative bus.

Interface Connector

The power shelf has an optional DSB, 25-pin, female interface connector on the back. The power system can be monitored and controlled through this interface

Pin Assignment of the Interface Connector

Pin Number	Signal Name	Description
1	DC Fail_2	DC fail signal of the second power module*.
2	A2	I ² C address bit 2.
3	A3	I ² C address bit 3.
4	ON SYNC	Power-on synchronization for multi-shelf operation
5	SDA	I ² C serial data bus
6	SCL	I ² C clock
7	NC	No connection
8	On/Off_1 (Optional)	Remote On/Off control for the first power module*.
9	OTP_1	Fan fail or over temp. signal of the first power module*.
10	On/Off_2 (Optional)	Remote On/Off control for the second power module*.
11	Vaux** (Optional)	Provide an auxiliary voltage for customer's system usage.
12	DC Fail_1	DC fail signal of the first power module*.
13	AC Fail_3 (Optional)	AC fail signal of the third power module*.
14	OTP_3	Fan fail or over temp. signal of the third power module*.
15	DC Fail_3	DC fail signal of the third power module*.
16	INT BUS	Intermediate DC bus. It is for shelf internal usage.
17	AC Fail_1 (Optional)	AC fail signal of the first power module*.
18	On/Off_3 (Optional)	Remote On/Off control for the third power module*.
19	SRTN	Signal return and Vaux return.
20	RS-	Remote sense for V-
21	OTP_2	Fan fail or over temp. signal of the second power module*.
22	RS+	Remote sense for V+
23	AC Fail_2 (Optional)	AC fail signal of the second power module*.
24	CS	A single-wire interface for current sharing.
25	V-	V-.

*Refer to "Mechanical Outline" for the locations of power module 1, 2 and 3.

** Vaux is optional to provide a 10 watts of auxiliary power to external system under request.

R2250 FRONT END AC-DC POWER SHELF
AC Input: 85V to 264V DC
Output: 24V to 28.5V, 2250W

Product Specification



Powerstax A0750 series Power Modules

Please see Powerstax data sheet for detail)

The Powerstax A0750 series power shelf is intended for operation with the Powerstax R2250 series power modules. These modules convert the AC input power to a regulated, low-noise DC bus voltage. Modules are available with 750W at 24 - 28.5VDC. Higher output voltages available with the A0800 & A1000 series power modules.

ORing diode is used at the output of each module to prevent the module from bringing down the bus voltage either during hot insertion or as the result of a module fault. The connectors between the power module and shelf are selected to prevent from blind mating and support hot insertion and removal. Active current sharing between paralleled modules and shelves distribute the load evenly between multiple power units.

Fault & Status Reporting

The A0750 series power modules provide a number of status report and remote control features. Those signals are aggregated on the host interface on the back of the shelf. Please refer to the module's data sheet for detailed definition of each signal. Host interface is optional for the shelf.

Fault Management

The modules are fully protected from damaging either the load or themselves under single fault or abnormal operating conditions.

Fault or Abnormal Condition	Response
AC Input Surges and Transients	The robust design of these units provides superior immunity to AC line transients and surges.
Loss of AC Input Power	The module will continue operation without interruption or assertion of the POWER FAIL WARNING signal within 1/2 cycle of outages of main power. Typical holdup time is 20ms.
Output Overvoltage	Under any single fault condition, the output voltage will not exceed 64V.
Internal Overheating	The module is fully protected against damage from excessive heat. The unit will automatically recover once it has cooled down.
Output Overload	When output current exceeds maximum limit, the module goes into a constant power mode and output voltage falls. The unit will run in hiccup mode when the output voltage is below 39V ($\pm 2V$).

Visual Indicators

Each power module (A0750) has two LEDs to provide visual status information. Please see the following table for these indicators.

Name	Colour Illumination	Meaning
LED 1 AC OK	Green	Input voltage OK
LED 2 Output OK or Output fail	Green Amber	The unit is powered up and operating normally or The unit has detected an internal fault or overload condition.

EMI Performance

The shelf will meet CISPR Class B, conducted emissions – EN55022 stand-alone.

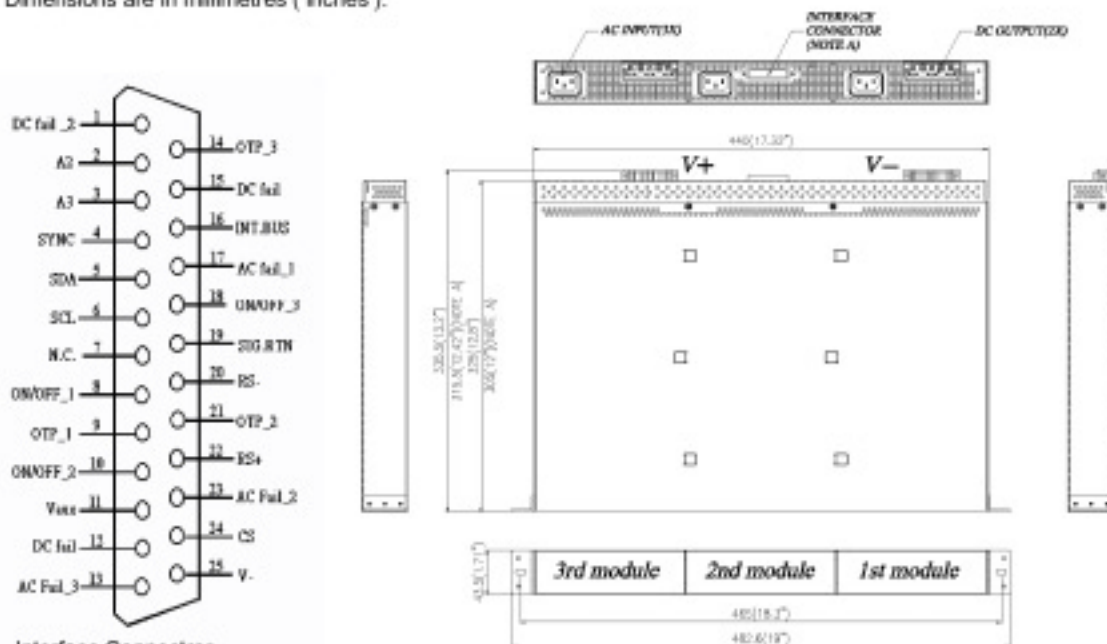
R2250 FRONT END AC-DC POWER SHELF

Product Specification



Mechanical Outline

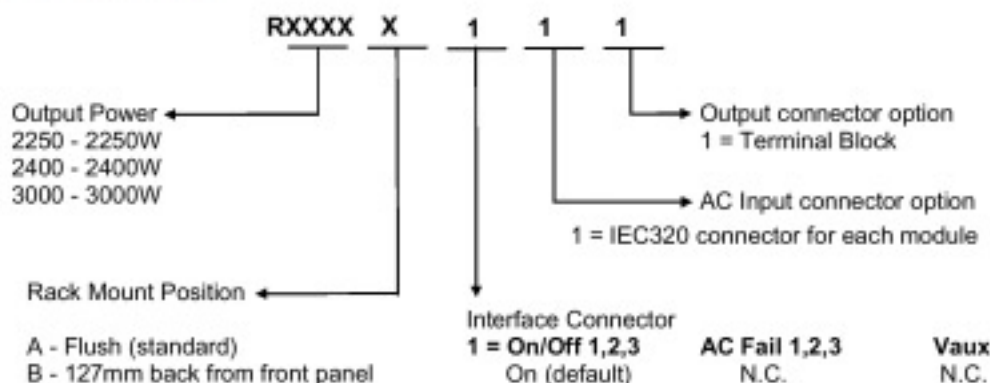
Dimensions are in millimetres (inches).



NOTE A : Entry level, short version, without interface connector

Fig 1. R2250 series Power Shelf

Selection Guide



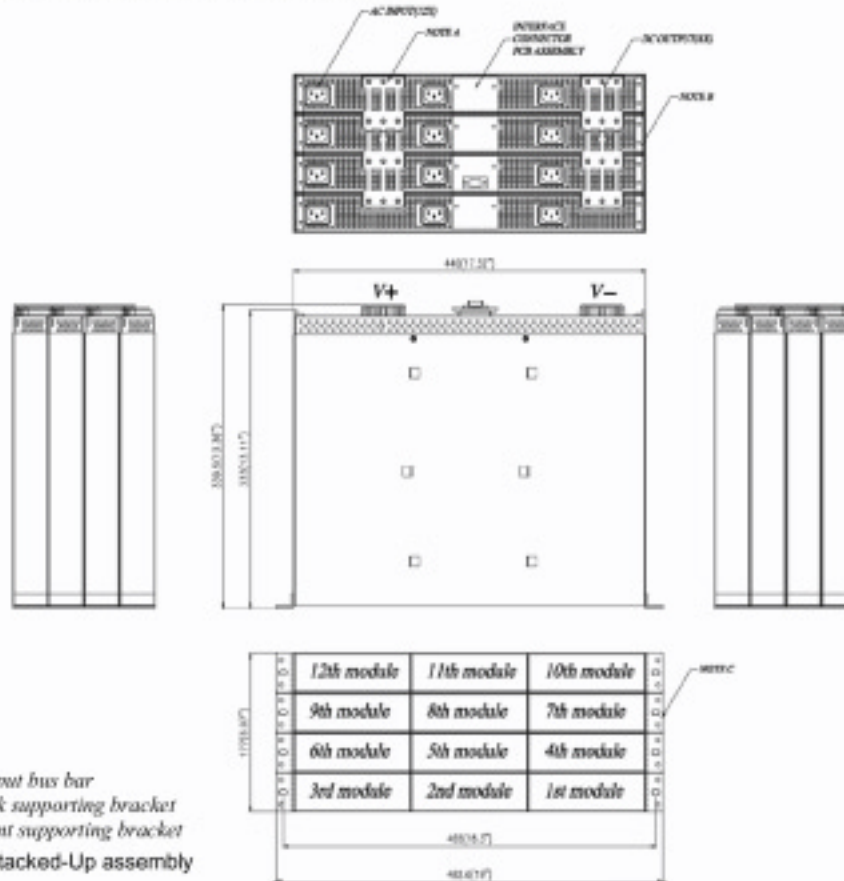
R2250 FRONT END AC-DC POWER SHELF
AC Input: 85V to 264V DC
Output: 24V to 28.8V, 2250W

Product Specification



Stacked Assembly

Please consult Powerstax to stack up power shelves.



Accessory

Product Name
Dummy Front Panel for R2250 Power Shelf
Part Ref: ZBLP-001



Fig 2. Dummy Front Panel for Powerstax R2250 series Power Shelf

Information & specifications contained in this data sheet are believed to be correct at the time of publication. However, Powerstax accept no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subject to change without notice.

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