

Applicant:

Ericsson Microwave Systems AB

FCC ID:

OOLULKL60104

Exhibit 10

ALIGNMENT PROCEDURE

Alignment Procedure

All the necessary adjustments are set in the factory and will need no further adjustments in the field. (Oscillators, waveguide filters are tuned to the right frequencies, Tx amplifier are set and verified not exceed maximum output levels, etc.)

Actual channel frequency as well actual transmitter output power are selected, through software, during installation and commissioning.

If a failure occurs, causing for instance the RF oscillator to go out of phase-lock, the transmitter will automatically shut down.

10

Technical Data

10.1 System Parameters

The MINI-LINK BAS operates with the following high frequency parameters.

10.1.1 Frequency Range

The following channel spacing feature is available: 28 MHz for 37.5 Mbps.

The RAU is available for different frequency channel arrangements, according to FCC, ITU-R and ETSI recommendations. The MINI-LINK BAS frequency bands are listed below.

Frequency bands (GHz)	Frequency range (GHz)	Duplex distance (MHz)	Channel spacing (MHz)
ETSI 26 GHz	24.5-26.5	1008	28
LMDS "A" 28 GHz	27.5-28.35	420	28
LMDS "B" 31 GHz	31,0-31,30	225	28

ETSI 26 GHz frequency plan, related to CEPT rec. TR 13-02			
Channel number	Duplex (MHz)	Downlink Tx	Uplink Tx
1	1008	24.563 GHz	25.571 GHz
2	1008	24.591 GHz	25.599 GHz
3	1008	24.619 GHz	25.627 GHz
4	1008	24.647 GHz	25.655 GHz
5	1008	24.675 GHz	25.683 GHz
6	1008	24.703 GHz	25.711 GHz
7	1008	24.731 GHz	25.739 GHz
8	1008	24.759 GHz	25.767 GHz
9	1008	24.787 GHz	25.795 GHz
10	1008	24.815 GHz	25.823 GHz
11	1008	24.843 GHz	25.851 GHz
12	1008	24.871 GHz	25.879 GHz
13	1008	24.899 GHz	25.907 GHz
14	1008	24.927 GHz	25.935 GHz
15	1008	24.955 GHz	25.963 GHz

ETSI 26 GHz frequency plan, related to CEPT rec. TR 13-02			
Channel number	Duplex (MHz)	Downlink Tx	Uplink Tx
16	1008	24.983 GHz	25.991 GHz
17	1008	25.011 GHz	26.019 GHz
18	1008	25.039 GHz	26.047 GHz
19	1008	25.067 GHz	26.075 GHz
20	1008	25.095 GHz	26.103 GHz
21	1008	25.123 GHz	26.131 GHz
22	1008	25.151 GHz	26.159 GHz
23	1008	25.179 GHz	26.187 GHz
24	1008	25.207 GHz	26.215 GHz
25	1008	25.235 GHz	26.243 GHz
26	1008	25.263 GHz	26.271 GHz
27	1008	25.291 GHz	26.299 GHz
28	1008	25.319 GHz	26.327 GHz
29	1008	25.347 GHz	26.355 GHz
30	1008	25.375 GHz	26.383 GHz
31	1008	25.403 GHz	26.411 GHz
32	1008	25.431 GHz	26.439 GHz

LMDS "A" 28 GHz frequency plan			
Channel number	Duplex (MHz)	Downlink Tx	Uplink Tx
1	420 MHz	27.519 GHz	27.939 GHz
2	420 MHz	27.547 GHz	27.967 GHz
3	420 MHz	27.575 GHz	27.995 GHz
4	420 MHz	27.603 GHz	28.023 GHz
5	420 MHz	27.631 GHz	28.051 GHz
6	420 MHz	27.659 GHz	28.079 GHz
7	420 MHz	27.687 GHz	28.107 GHz
8	420 MHz	27.715 GHz	28.135 GHz
9	420 MHz	27.743 GHz	28.163 GHz
10	420 MHz	27.771 GHz	28.191 GHz
11	420 MHz	27.799 GHz	28.219 GHz
12	420 MHz	27.827 GHz	28.247 GHz
13	420 MHz	27.855 GHz	28.275 GHz
14	420 MHz	27.883 GHz	28.303 GHz
15	420 MHz	27.911 GHz	28.331 GHz

LMDS "B" 31 GHz frequency plan			
Channel number	Duplex (MHz)	Downlink Tx	Uplink Tx
1	225 MHz	31,021 GHz	31,251 GHz
2	225 MHz	31,049 GHz	31,279 GHz

10.1.2 Transmitter Performance

Transmitter output power has the following typical values with the guaranteed value within parentheses:

- 23(21) dBm for ETSI 26 GHz
- 23(21) dBm for LMDS "A" 28 GHz
- 23(21) dBm for LMDS "B" 31 GHz

Note: Filter loss is included.

Frequency Tolerances

The frequency stability is +/- 10 ppm from nominal centre frequency. Both Tx and Rx oscillators (VCO) are phase locked loop controlled.

Output Spectrum

The transmitter spectrum stays in all operating conditions within the given mask centred at nominal channel frequency. There is also a typical output spectrum reported, see Figure 10–1.

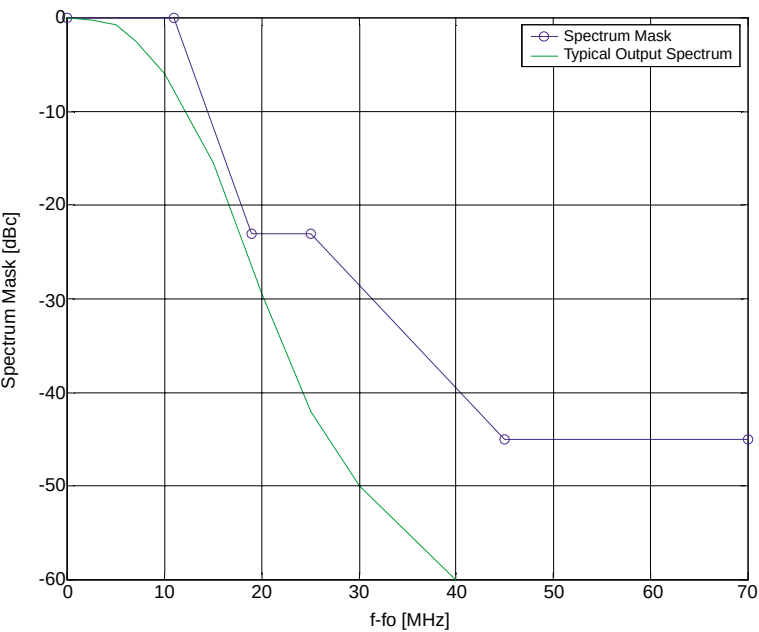


Figure 10–1 Transmitter Mask

Capacity	Power density level (dB)			Frequency (MHz)				
	A0	A1	A2	f1	f2	f3	f4	f5
Mbps								
37.5	0	-23	-45	11	19	25	45	70

10.1.3 Receiver Performance

Receiver input threshold has the following typical values with the guaranteed values within parentheses:

BER	BER 10^{-3}	BER 10^{-6}	BER 10^{-9}
Power Level (dBm)	-82 (-81)	-78 (-77)	-75 (-74)

Co-Channel Interference

The limits of co-channel interference are given in the table below with the guaranteed values on brackets.

BER limit	C/I for 1dB increase of BER limit	C/I for 3dB increase of BER limit
10^{-3}	17 (18) dB	14 (15) dB
10^{-6}	21 (23) dB	17 (19) dB

Adjacent Channel Interference

The limits of adjacent channel interference are given in the table below with the guaranteed values on brackets.

Channel spacing	BER limit	C/I for 1dB increase of BER limit	C/I for 3dB increase of BER limit
28 MHz	10^{-3}	-6 (-5) dB	-9 (-8) dB
	10^{-6}	-2 (0) dB	-6 (-4) dB

Signature

Reference delay is 6.3 ns.

Values between brackets for non-minimum phase.

Traffic capacity Mbps	BER 10^{-3}		BER 10^{-6}	
	Notch depth (dB)	Signature width (MHz)	Notch depth (dB)	Signature width (MHz)
37.5	14 (17)	24 (20)	11 (14)	24 (21)

10.1.4 Transmission Technology

Downlink TDM and Uplink TDMA are in accordance with the ETSI standards EN 301 213 Part 1 and Part 3.

- Maximum number of sectors for Hub is 4, with a 90°-sector antenna.

Note: For added capacity it is possible to have more overlapped sectors, for example, up to 6 sector for each Hub, using different channel frequencies.

- Frequency reuse: 2.
- Modulation Scheme: C-QPSK.
- Spectral Efficiency: 1.3 bps/Hz.
- System power level control: overall dynamic range is greater than 60 dB, for semi fade compensation and path loss compensation. Compensated fade slope up to 50 dB/sec. Transmitter Power Control (ATPC) dynamic range is 35 dB.
- Path coverage calculations are based on the following standards:
 - Flat multipath fading according to ITU-R Rec. P. 530-7, sec. 2.3;
 - Rain fading according to ITU-R Recommendations P. 530-7, sec. 2.4;
 - Selective multipath fading according to ITU-R Rec. P. 530-7, sec. 5.1;
 - Atmospheric absorption according to ITU-R Rec. P. 676-3 annex 2.

10.2 Intermediate Frequency

IF Transmitting

350 MHz

IF Transmitting Power Level

- Modem output: -2 dBm - +2 dBm
- Radio input: -20 dBm - +2 dBm.

IF Receiving Power Level

- Modem input: -70 dBm - +10 dBm
- Radio output: -50 dBm - +5 dBm

IF Receiving

Approximately 1 GHz, after the first down conversion, and 140 MHz, after the second down conversion.

IF Receiving Power Level

-45 dBm - 0 dBm.

10.3 System Features

The MINI-LINK BAS is featured by the following system parameters.

Maximum Configuration

- AT/RN Number: 64
- Max. RN/R-AAS Number: 6
- Max. AT/CP Number: capacity verified up to 128 AT/CP
- Max. CP/EM Number: 10

Maximum Connections

1. ET
 - 4096 VPC available, whose 15 are available for VC connections
 - 1792 VCC per VPC on 15 VPC

Note: Default configuration: NNI Mode

2. CP

Maximum connections per CP: 4500.

3. PVC/AT

Maximum connections per PVC/AT: 256.

Max. Cell Capacity Over Air Interface

78,000 cells per second, in Downlink

R-AAS Switching Throughput

530 Mbps

Supported Ethernet Functionality

IP services are carried transparently through the system using a self-learning bridge at the AT.

The number of terminals (PCs, workstations), connected to one AT, is limited to 256 due to the MAC addresses number stored in the self-learning bridge.

Supported ATM Service Classes

UBR and CBR

Granularity

ATM cell

User Interfaces

POTS, BRA ISDN, PRA ISDN, V.11, V.24, X.21 and Token Ring can be fulfilled with an external user multiplexer/equipment. The following services are directly supported by system interfaces:

- Ethernet 10BaseT built-in
- Ethernet 10/100 BaseT (plug in card)
- E1 unstructured G.703
- T1 unstructured ANSI T1.403, G.703

E1/T1 service interface units are configurable via system parameters.

Network Interfaces

- E1 unstructured G.703
- T1 unstructured ANSI T1.403, G.703
- E3 ITU-T G.703, G.804, G.832
- optical OC-3/STM-1 S1-1 ITU-T G.957, G.707, I.432.1
- DS3 ITU-T G.703 120 Ohm, G.804, G.832

E1/T1, OC-3/STM-1, E3/DS3 units are configurable via system parameters.

Total Sign-On Time

Sign-on at initial start (average time)

- 10 AT population in 6 min;
- 30 AT population in 8 min;
- 64 AT population in 15 min;

Sign-on after the sign-off per single AT

- 11-14s including traffic set-up.

Fading for the whole AT population in the considered sector

- *deep fading up to 5 minutes*
instantaneous recovery of the traffic;
- *deep fading for more than 5 minutes:*
sign on of all the ATs (including traffic) in 10 minutes.

10.4 Power Supply

The MINI-LINK BAS is featured by the following power supply parameters.

Input Voltage

-48 Vdc. Tolerance range: -38 V- -60 V.

AT Input Voltage

110/220 Vac. Tolerance range: 90-264 Vac

50/60 Hz. Tolerance range: 47-63 Hz

R-AAS Power Consumption

Fully equipped with six RNs, 350 W, indoor and ODU included

C-AAS (CE Shelf) Power Consumption

Fully equipped, 230 W.

AT Power Consumption

70 W including fully equipped indoor and ODU

CP

200 W

Power Efficiency

POU Max 32 W

PSU Max 50 W

10.5 Antenna Data

For detailed ordering and information on electrical data of antennas see the *Product Catalogue*. For further technical details please contact your Ericsson representative.

10.5.1 Radio Node Antennas

The RN antenna for point-to-multipoint is a 90° sector antenna. The half-power beamwidth in the azimuth direction is typically $\pm 38^\circ$ for all the supported frequency bands.

The half-power beamwidth in elevation is typically $4.5^\circ \pm 0.4^\circ$ for 26 GHz, $4.5^\circ \pm 0.3^\circ$ for 28 GHz, and $4.4^\circ \pm 0.3^\circ$ for 31 GHz.

In case of point-to-point connections, the directional AT antenna (see 10.5.2 for technical data) can be used on the RN as well.

RN Antenna Dimensions

296x266x118 mm, including radome.

Weight 3.8 kg. Mounting kit weight 2.3 kg.

RN Antenna Polarisation

Vertical and horizontal

RN Antenna Gain

Sector antenna 21 ± 0.5 dBi for ETSI 26 GHz band, 21.7 ± 0.5 dBi for LMDS "A" 28 GHz band, and $21.2 \text{ dBi} \pm 0.5 \text{ dB}$ for LMDS "B" 31 GHz.

RN Antenna EIRP

Typically 44 (41.5) dBm for ETSI 26 GHz band, 44.7 (42.2) dBm for LMDS "A" 28 GHz band, and 44.2 (41.7) dBm for LMDS "B" 31 GHz band. Guaranteed value within parentheses.

10.5.2 AT Antennas

0.24 m directional antenna with a 3.6 half-power beamwidth is minimum 3.0° and maximum 4.1° for 26 GHz.

0.24 m directional antenna with a 3.3 half-power beamwidth is minimum 2.9° and maximum 3.7° for 28 GHz.

0.24 directional antenna with a 3.0° is minimum 2.5° and maximum 3.4° for 31 GHz.

These antennas are used on the RN, in case of point-to-point connection.

0.60 m antennas are available on request.

AT Antenna Dimensions

296x266x98 mm, including radome

Weight 2.5 kg

Mounting kit weights 2.9 kg.

AT Antenna Polarisation

Vertical and horizontal

AT Antenna Gain

- ETSI 26 GHz, 33.8 ± 1 dBi for 0.24 m directional antenna
- LMDS "A" 28 GHz, 34.6 ± 1 dBi for 0.24 m directional antenna
- LMDS "B" 31 GHz, 34.6 ± 1 dBi for 0.24 m directional antenna

AT EIRP

- ETSI 26 GHz, 56.8 (53.8) dBm for 0.24 m directional antenna
- LMDS "A" 28 GHz, 57.6 (54.6) dBm for 0.24 m directional antenna;

Note: Guaranteed values are within parentheses.

10.6 Environmental Requirements

10.6.1 Cabinets/Racks/Frames

BYB 501 can be used if compliance with ETS 300 119-2 is required.

Rear access C-AAS (CE Shelf) require cabinet that is lined up single-in-line to allow the rear access. The cabinet may be metric or 19" or 23".

10.6.2 Power Distribution

If high ohmic distribution is available, no PDU is needed. If only low ohmic distribution is available, the PDU is required in order to comply with ETS 300 132-2.

If two wire distribution is available, 0V shall be connected to GND at the input to the PDU or at the input of each subrack if the PDU is not used.

10.6.3 EMC

Dummy front panels must be used to cover empty slots in the AAS's as well as the FlexNU in order to comply with EMC requirements. All front panels must be screwed to the subrack using proper torque in order to comply with requirements on EMC and vibrations endurance.

Wrist strap (or other comparable means) shall be used when handling ESD sensitive part.

10.6.4 Alarms

The following fan, power and external alarms are supported by HW:

- Fan A-alarm, Fan B-alarm (A is more serious than B)
- DC in alarm from POU
- DC in alarm from redundant POU/ PSU
- DC out alarm
- DC out alarm from POU/PSU
- External alarms

10.7 Characteristics

MINI-LINK BAS is based on the following general requirements:

- ETS EN 301 213-1 for Europe
- ETS EN 300 213-2 for Europe
- FCC part 2 for US
- FCC part101 for US

10.7.1 Central Office

The central office equipment is designed for compliance with the following standards.

Safety

- EN 60 950
- UL 1950
- CAN/CSA-C22.2 No. 950-95

Engineering Requirements for Racks, Cabinets and Subracks

- ETS 300 119-2, BYB 311 and BYB 501
- ETS 300 119-3, BYB 311
- ETS 300 119-4, front access subracks
- GR-63-CORE
- GR-78-CORE

Electromagnetic Compatibility, EMC

- ETS 300 385
- GR-1089-CORE by FCC part 15, class B

Overvoltage (surge/lightning, power induction, power fault, EFT)

- ETS 300 385,
- ITU-T K.20
- GR-1089-CORE, current limiting protector, heat coil, required

Environmental Conditions, Operational Environment (climatic and mechanical endurance)

- ETS 300 019-1-3 Class 3.1

Full performance temperature: +5°C - +40°C

- Short period temperature: -5°C - +50°C

No full performance

Period is less than 15 days/year or less than 96 hours.

- GR-63-CORE, earthquake zone 4

Environmental Conditions, Transportation (climatic and mechanical endurance)

- ETS 300 019-1-2 Class 2.3
- GR-63-CORE

Environmental Conditions, Storage (climatic endurance)

- ETS 300 019-1-1 Class 1.1
- GR-63-CORE

Power Supply Interface

- ETS 300 132-2

Earthing and Bonding

- ETS 300 253

10.7.2 AT

The Access Termination (AT) equipment is designed for compliance with the following standards.

Safety

- EN 60 950
- UL 1950
- CAN/CSA-C22.2 No. 950-95

Electromagnetic Compatibility, EMC

- ETS 300 386-1, table 4
- FCC part 15

Overvoltage (surge/lightning, power induction, power fault, EFT)

- ETS 300 385
- ITU-T K.21

**Environmental Conditions, Operational Environment
(climatic and mechanical endurance)**

- ETS 300 019-1-3 Class 3.1 (with exception for solar radiation)
- Full performance temperature: +5°C - +40°C
- Short period temperature: -5°C - +50°C
No full performance
Period is less than 15 days/year or less than 96 hours.

**Environmental Conditions, Transportation
(climatic and mechanical endurance)**

- ETS 300 019-1-2 Class 2.3

Environmental Conditions, Storage (climatic endurance)

- ETS 300 019-1-1 Class 1.1

10.7.3 ODU

The ODU equipment is designed for compliance with the following standards.

Safety

- EN 60 950
- EN 60 215
- EN 60 529
- UL 1950
- CAN/CSA-C22.2 No. 950-95

Electromagnetic Compatibility, EMC

- ETS 300 385
- FCC Part 15

Overvoltage (surge/lightning, power induction, power fault, EFT, etc)

- ETS 300 385
- ITU-T K.20
- GR-1089-CORE, current limiting protector, heat coil, required

**Environmental Conditions, Operational Environment
(climatic and mechanical endurance)**

- ETS 300 019-2-4 class 4.1
Full performance, shade temperature: -33°C - +60°C
Full performance temperature
plus solar radiation of 1120 W/m²: -33°C - +45°C
- TR-NW-000057

**Environmental Conditions, Transportation
(Climatic and mechanical endurance)**

- ETS 300 019-2-2 Class 2.3
- GR-63-CORE

**Environmental Conditions, Storage
(climatic endurance)**

- ETS 300 019-1-1 Class 1.1
- GR-63-CORE

Environmental Requirements, Wind Load

Installation gear is designed and tested for operational wind speed up to 50 m/sec and survival conditions up to 70 m/sec. The load and torque requirements, at operational wind velocity, are given in the following table.

Antenna	F (N)	M (Nm)
0.24 m	170	40
0.60 m	570	180

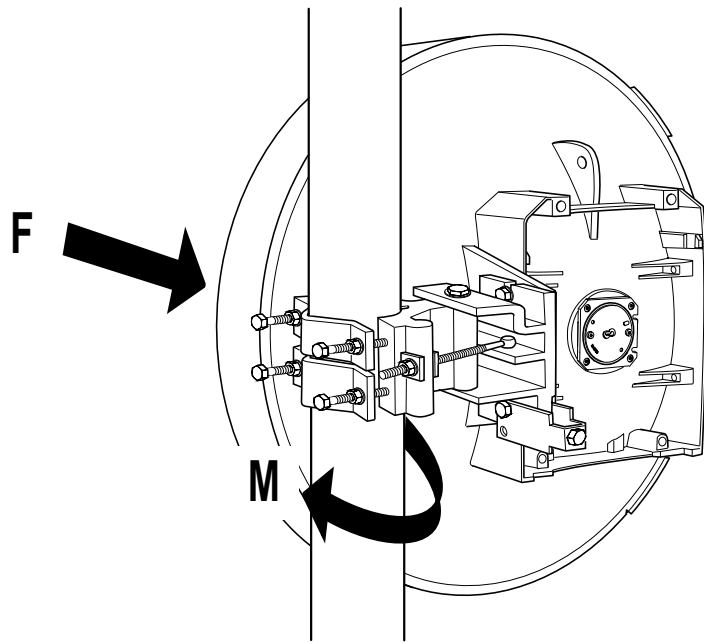


Figure 10-2 Wind Load

10.8 Miscellaneous Features

Mounting Devices

The standard antenna mounting kit for 0.24 m antennas consists of two rigid, extruded aluminium profiles connected with a screw of stainless steel.

The elevation can be adjusted in a $\pm 13^\circ$ range. The azimuth can be changed $\pm 65^\circ$.

AT Local Management Interface

RS-232 interface for ACT connection

AT Received Signal Strength

AT received signal strength is read directly from the ODU using a standard voltmeter.

CP Hardware Platform

PU is a FORCE-TRI/50T, with Sparc Station similar functionality. The CP platform is installed in a VME chassis, mounted in a 19" rack. The operating system is Sun Solaris 2.6.

EM Hardware Platform

Minimum requirements are the following:

- Sun Sparc Station Ultra 5
- Sun Solaris 2.6 operating system
- HP-OV