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**7/8 GHz CEPT digital hierarchy**

# MDL 2007/2008

***point-to-point***

***digital radio***

Nowadays, most users give preference to microwave radio as the best transmission system because it offers economy, speed of use, service quality and high reliability. Many manufacturers offer similar products and users must consider both the purchasing and operational criteria when making their choice. This is why some specific aspects were given special attention which are, today, considered by the professionals as absolutely essential, namely:

- Fast delivery
- Easy installation
- Easy commissioning without special tools
- Easy maintenance
- Network management capability
- Perfect transmission quality
- First-class associated services

MDL 2000 is available with capacities from 2 to 16x2 Mbit/s and frequencies ranging from 7 to 38 GHz to meet all needs and handle all applications: cellular networks, private and emergency networks, fixed service infrastructure networks, campus and Internet CPE or ISP access, compliant with your country's regulations and propagation constraints. All MDL 2000 products comply with ITU-R and ETSI high performance specifications. The concept of MDL 2000 is based on a combined experience in key areas such as function integration in "ASIC" digital components and "MMIC" microwave components.

Thanks to its fully modular architecture, MDL 2000 is offered both in the (1+0) configuration with the following building blocks:

- RFU (Radio Frequency Unit) containing the RF frequency modules
- IDU (InDoor Unit) integrating the PRU (PRocessing Unit) and the supervision functions
- Integrated antenna with remote mounting capability
- a single coaxial cable linking the RFU and IDU (up to 300 m)
- and in the highly securized (1+HSB) or (1+1) configurations.

MDL 2000 is clearly positioned as the reference product for the low- and medium- capacity microwave transmission market.

**Network Management -** MDL product line has a built-in diagnosis function for either a single link with the Local Control System (LCS) or a complete network with the TIME 2G supervision system. The main functions are:

- transmission quality
- links availability
- fault location
- maintenance

For simplified maintenance, a wide range of relay loops is also available to connect MDL product line to an external supervision system. In addition, the link parameters are stored on a Plug & Play Unit (PPU) within the IDU simplifying operation, configuration and maintenance. Combined with a superb LCS, it provides operators with one of the most user-friendly, easy to install and maintain point-to-point digital radio.

**MDL 2007/2008 Specifics -** In the 7 GHz and 8 GHz frequency bands, the MDL 2000 offers very large system gains. The MDL 2007/2008 RFU mechanical design enables either split-mount installation or full indoor mounting into a 19-inch rack. Compact, lightweight and very easy to install, the small size RFU is particularly well-suited for sub-urban and regional applications. The MDL 2007/2008 (1+1) configuration with associated software features smoothly opens space and frequency diversity capabilities.

***next level solutions***

# MDL 2000 - 7/8 GHz CEPT digital hierarchy

## System Characteristics

**Frequency Range:** Xmtr/Rcvr Frequency Spacing:
7,100 - 7,725 MHz 154, 161, 168 MHz
8,000 - 8500 MHz 126, 213.5 MHz
Other Frequency Spacings possible

**Modulation:** OQPSK (Offset Quadrature Phase Shift Keying)

**Bit Rate Capacity:** 2, 4, 8 or 16x2 Mbit/s

**Channel Bandwidth:**

| 2x2 Mbit/s | 4x2 Mbit/s | 8x2 Mbit/s | 16x2 Mbit/s |
|---|---|---|---|
| 3.5 MHz | 7.0 MHz | 14 MHz | 28 MHz |

**Frequency Source:** Programmable Synthesizer, full tuning range

**Tuning Range:** up to 70 MHz (depends on Frequency Spacing)

**Configurations:** Non-protected, 1+HSB/1+1 equipment protection, Frequency and Space Diversity

**IDU/RFU Interconnection:** Separation 300 m max.
*Single coaxial cable, Belden 9248 (up to 200 m) or Belden 9292 (up to 300 m)*

**Digital Interface:** 2 Mbit/s 120 ohms, bal. or 75 ohms, unbal.

**Line Code:** HDB3, ITU-T G703,

**Data Channel:** 64 kbit/s data + clock

**Data Interface:** RS422 (V11) co or contra-directional

**VF Orderwire:** RJ 11 female connector

**Network Management:** TIME 2G Element Manager (EM)

**NMS Interface:** Access to TIME 2G EM through Mediation Device; SNMP at TIME 2G level; dry relay contacts

**Radio Control/Monitoring Tools:** RS232 (V24/V28)
- Craft Interface software application which operates on a Laptop (Local Control System : LCS)
- Handheld keypad

**Fault Detection:** Auto-Diagnostics, replace-me LEDs

**Alarms:** Indoor Unit, Outdoor Unit, Tributary, Summary

**Operating Environment:**

| | Indoor | Outdoor |
|---|---|---|
| Guaranteed Performance: | -10°C to +50°C | -30°C to +55°C |
| Operational: | -10°C to +55°C | -40°C to +60°C |

Humidity: Indoor, 95% max. 100 % (non-condensing)

**Power Source:** -40.5 to -57 Vdc, positive ground

**Power Consumption:**

| | | |
|---|---|---|
| **1+0:** | 2, 4x2 Mbit/s < 40 W | 8, 16x2 Mbit/s < 45 W |
| **1+HSB/1+1:** | 2, 4x2 Mbit/s < 80 W | 8, 16x2 Mbit/s < 90 W |

## Transmitter Characteristics

**Power Output:** 7 GHz: +27 dBm 8 GHz: +26 dBm

**RF Power Attenuation:** 15 dB in 1 dB steps

**Power Mute Control:** > 50 dB attenuation

**Frequency Stability:** ± 10 ppm including aging

*Typical performance specifications given here apply to transmitters and receivers connected back-to-back and must be confirmed before they become applicable to any specific system, contract or order.*

## System Gain

7 GHz;

| BER | 2x2 Mbit/s | 4x2 Mbit/s | 8x2 Mbit/s | 16x2 Mbit/s |
|---|---|---|---|---|
| $1 \times 10^{-3}$ | 120 dB | 117 dB | 114 dB | 111 dB |
| $1 \times 10^{-6}$ | 117 dB | 114 dB | 111 dB | 108 dB |

8 GHz;

| BER | 2x2 Mbit/s | 4x2 Mbit/s | 8x2 Mbit/s | 16x2 Mbit/s |
|---|---|---|---|---|
| $1 \times 10^{-3}$ | 119 dB | 116 dB | 113 dB | 110 dB |
| $1 \times 10^{-6}$ | 116 dB | 113 dB | 110 dB | 107 dB |

## Receiver Characteristics

**Noise Figure:** 6 dB at antenna port

**Sensitivity:**

| BER | 2x2 Mbit/s | 4x2 Mbit/s | 8x2 Mbit/s | 16x2 Mbit/s |
|---|---|---|---|---|
| $1 \times 10^{-3}$ | -93 dBm | -90 dBm | -87 dBm | -84 dBm |
| $1 \times 10^{-6}$ | -90 dBm | -87 dBm | -84 dBm | -81 dBm |

**Residual BER:** < $10^{-11}$ BER **RF Overload:** (no errors) – 20 dBm

**Frequency Stability:** ±10 ppm including aging **FEC:** Built-in

## Regulatory Information

**Frequency Plans:**
7 GHz: ITU-R Rec. F.385, EN 301 216
8 GHz: ITU-R Rec. F.386, EN 301 216

**Electromagnetic Interference Standards:**
ETS 300 385 (EN55022)

## Mechanical Characteristics

**Cable Connector:** *IDU to RFU:* Type N-Type Female

**Rack Size:** IDU: 483 mm (19") IEC or ETSI rack
RFU: Pole mount

**Dimensions:**

| | Diameter | | Depth |
|---|---|---|---|
| RFU: | 264 mm | | 267 mm *(excluding antenna)* |
| | Height | Width | Depth |
| IDU: | 44 mm | 438 mm | 240 mm 2 to 4x2 Mbit/s |
| IDU: | 88 mm | 438 mm | 240 mm 2 to 16x2 Mbit/s |

**Weight:**
RFU: 7.5 kg *(excluding antenna)*

## Antenna Characteristics

**Type:** Parabolic, integrated antenna available in 1.2 m size. Remote mounting (option) Compliant to ETSI ETS 300 833

**Connections:** Waveguide size: EIA WR112 **Flange:** IEC UBR84

**Mounting:** Pole mounting

**Alignment:** Alignment kit delivered with antenna

**Polarization:** Horizontal or Vertical by simple rotation of RFU

**Windload:** Operational: 145 km/h **Survival:** 200 km/h

Indoor Unit (1+0) 2/4x2 Mbit/s

Indoor Unit (HSB / 1+1) 2/4x2 Mbit/s

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Harris Communication S.A. | Centrale Parc, Bât. 4 Immeuble Pasteur, | Avenue Sully Prudhomme
92298 CHATENAY-MALABRY - France | Phone: 33 (0) 1 55 52 80 00 | Fax: 33 (0) 1 55 52 80 01
**www.harris.com**