



FAISCEAU HERTZIEN NUMERIQUE SAF



CFM-22L digital microwave radio link system provides wireless point-to-point channels for digitized voice and data communications.

It allows voice and data transmission in both metropolitan and rural areas between points up to 25 km apart.

Typical applications include PABX trunk connectivity, private combined data&voice networks, cellular networks and medium speed access to backbone networks of providers of data services.

CFM-22L is available with 8, 16 or 34 Mbps Full Duplex traffic capacity.

Typical installation site consists of following components:

- Indoor Unit (IDU).
- Outdoor Unit (Radio, ODU),
- Antenna
- coaxial cable connecting IDU and ODU
- DC power source to power the equipment (mounted indoor).

CFM-22L product line

| | CFM-22 version | 8 Mbps CFM-22 | | 16 Mbps CFM-22 | | | 34 Mbps CFM-22L | | |
|--|-----------------------|------------------------|--|---------------------|---|--|-----------------------------|-----------------------------|---------------------|
| | Available IDU types | Remote Ethernet bridge | 4 Slot Flexible Multiplexer | 8xE1 | 4 Slot Flexible Multiplexer | | Remote Fast Ethernet Bridge | Remote Fast Ethernet Bridge | 8xE1 |
| | Configuration options | Fixed configuration | It is possible to combine 1-4 Ethernet, E1 and V.35 modules (flexible capacity configurations: | Fixed configuration | 1 fixed 8 Mbps slot for Ethernet or V.35 module | +3 configurable slots for combining Ethernet, E1 and V.35 modules (slots using 1x8 Mbps; 6+2; 4+2+2; | Fixed configuration | Fixed configuration | Fixed configuration |

| | | | | | | | | | |
|--|-------------------|-----------------------|---|------------------------|-------------------|-----------------------|-----------------------|------------------------|--|
| | | | 1x8 Mbps; 4x2 Mbps; 6+2; 4+2+2; 2+2+2+2). | | | 3x2). | | | |
| | Model Name | CFM-22 REB | CFM-22M | CFM-16- 8E1 | CFM-16-MUX | CFM-16 REB | CFM-34 REB | CFM-34 16E1 | |

8Mbps CFM-22L Indoor Units

8Mbps SAF CFM-22 is offered with two main types of indoor units:

- Single port dedicated Ethernet Bridge Unit (REB and REBII)
- 4 slot modular Flexible Multiplexer IDU



8 Mbps Remote Ethernet Bridge

8448 Kbps Remote Ethernet Bridge is designed for operation in conjunction with the CFM-22L radio outdoor unit.

Indoor unit contains single channel Bridge from 10Base-T LAN port to 8448 Kbps WAN channel over the radio.

Full/Half Duplex function on LAN port of the Bridge is switchable using onboard jumpers or employing any of available management interfaces.

Bridge Indoor Unit consists of compact 1U high 230mm deep 19" rack mountable unit and is intended for use with external 48V DC power supply. Outdoor and indoor units are interconnected via single coaxial cable.

Each Remote Ethernet Bridge unit contains management controller board and has following management interfaces:

- LCD display and control keypad
- Serial terminal port
- 10Base-T Ethernet port

All the basic configuration and monitoring functions are available from LCD/keypad if local management is a concern.

By connecting Indoor Unit to external data network (via serial port and modem or Ethernet) SNMP and Web interfaces of management system are available.

The Ethernet Bridge Indoor Unit is available in two versions:

- REB
- REB II

REB

REB IDU is implemented as a fully standard Remote Ethernet Bridge from 10Mbps Ethernet port to 8448 Kbps radio channel. Local monitoring is available through Web and SNMP interfaces, IDU is configurable through LCD display/keypad locally. REB IDU supports up to 1518 bytes long standard Ethernet packets, it is ideal for installations where affordability is the factor.

REBII

The REB II IDU is similar in performance and appearance to REB unit, it

provides several advanced features:

- ability to handle longer packets, (up to 1534 bytes), for example ones with VLAN tagging and QoS bits set.
- WAN/LAN packet counters are available;
- advanced SNMP monitoring and Telnet/terminal/Web based monitoring and configuration is available
- The bridge provides ability to generate and transmit packets in order to test WAN or LAN performance

REB II is ideal for sophisticated user, for installations where management features and extended Ethernet packet handling capabilities is a must.



8 Mbps CFM-22L Modular Multiplexer

Modular Multiplexer is designed for operation in conjunction with the CFM-22L radio outdoor unit.

Indoor unit contains a second order digital multiplexer, which multiplexes and demultiplexes four 2048Kbps universal channels into single 8448 Kbps channel transmitted and received by CFM-22 ODU unit. Multiplexer has 4 universal slots for interface modules, allowing any combination of available modules.

2-8Mbps can be configured to single slot for data modules

In current release of the multiplexer is offered with following types of single port modules:

- 2 Mbps G.703 E1
- 64K - 8 Mbps V.35 (64K 128K 256K 512K 1M 2M 4M 6M 8M)
- 2 - 8 Mbps FDX/HDX Remote Ethernet Bridge (2M 4M 6M 8M)

Modular Multiplexer consists of compact 1U high 230mm deep 19" rack mountable unit and is intended for use with external 48V DC power supply. Outdoor and indoor units are interconnected via single coaxial cable.

16 Mbps CFM-22L Indoor Units

16 Mbps CFM-22L also is offered with three types of interface block modulations:

- 8xE1 IDU
- 4 slot Multiplexer IDU
- Fast Remote Ethernet Bridge



16 Mbps CFM-22L 8xE1 Indoor Unit

8E1 IDU terminates full 16 Mbps of radio capacity into 8 fixed E1 interfaces, 2 Mbps throughput per each of eight E1 traffic interfaces.



16 Mbps CFM-22L Modular Indoor Unit

Multiplexer has 4 universal slots for interface modules. Second slot of the IDU provides 8 Mbps, it accepts REB or V.35 module. Another 3 slots share 8 Mbps of capacity and allow any combination of available modules (REB, V.35 and E1). Slots can be used 1x8 Mbps, 2+6 Mbps, 2+2+4 Mbps, 2+2+2 Mbps.

16 Mbps CFM-22L Fast Remote Ethernet Bridge

16Mbps REB unit is further development of original REB unit, it allows to utilize additional channel capacity of 16Mbps radio, supports long packets (VLAN tagged or other) and provides all basic management/monitoring functionality.

34 Mbps CFM-22L Indoor Units

34 Mbps CFM-22L is offered with two types of interface block modulations:

- 16xE1 IDU
 - Fast Remote Ethernet Bridge
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Modules for Indoor Units

The Multiplexer Indoor Units are offered with following interface modules:

- E1 - G.703 module;
 - Remote Ethernet Bridge module;
 - Synchronous data V.35 module.
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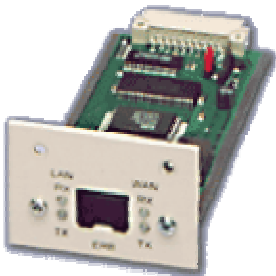


E1 module

E1 interface could be used to connect voice switches (PBX, other), multiplexers, voice/video codecs and any other telecommunications equipment supporting G.703 standard. Data rate 2048 Kbps full duplex, Interface synchronous data G.703 balanced or unbalanced with transparent data channel that allows any type of signalization and clocking.

Connectors:

- Balanced RJ45 120Ohm
 - Unbalanced 2xBNC 75Ohm
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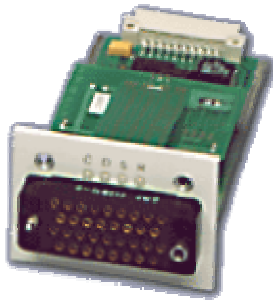
Remote Ethernet Bridge Module

REB module contains high performance standards based Remote Ethernet Bridge and is an excellent tool to connect any Ethernet devices or networks over the radio channel. It is fully compatible with IEEE802.3 standard. Ethernet Bridge module has 10Base-T (UTP) RJ-45 LAN interface. LAN part of the bridge module is capable of FDX or HDX operation, which is selectable from onboard jumper switches or management system.

Bridge automatically learns MAC addresses on the LAN to which it is connected and forwards only those frames destined for another LAN. The LAN table stores up to 10,000 addresses and is automatically updated.

Filtering and forwarding is performed at the maximum theoretical rate of 15,000 frames per second (wire speed). The buffer can hold 256 frames with a throughput latency of one frame. Filtering can be disabled for extender or segmented applications, allowing all traffic to flow over the WAN link.

Connector: 10Base-T, RJ-45



V.35 module

The typical use for V.35 port module are various data applications via connected router, ATM access device and the likes. Could be used with video/voice codecs, etc.

Data rate 64K-8Mbps Full Duplex, Interface-synchronous data V.35
Connector: V.35 female (M.34)



Outdoor Unit (ODU)

CFM-22L microwave radio unit is designed for operation in the 23 GHz radio band. Ease of installation and the radio's lightweight, portable design makes it ideal for last mile or quick-start applications. The ODU unit designed for all-weather operation, mounts directly to the back of antenna.

Outdoor and indoor units are interconnected via single coaxial cable. The signals carried in this cable are as follows

- transmit data,
- receive data,
- indoor unit to outdoor unit telemetry,
- outdoor unit to indoor unit telemetry,
- DC voltage to power outdoor unit.

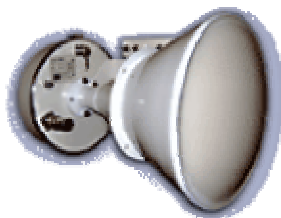
CFM-22L features a fully synthesized transceiver making frequency setup or changes in the field a simple task. CFM-22L utilizes fourlevel frequency shift keying (4FSK) modulation.

A calibrated AGC monitoring point is included on the outdoor unit for connection of multimeter during antenna alignment. The ODU unit is well protected by its metal case and weather- EMC sealing thus providing basis for reliable operation under any weather conditions.

CFM-22L radio is designed in compliance with ETSI standard EN 300 198 for digital point to point radio equipment employing 22-23 Ghz frequency band. CFM-22L radio is CE marked.

Antennas

Equipment is offered with choice of 3 standard antennas:



- 25 cm Lens-Horn antenna. Typically provides reliable operation for hops up to 10 km, depending on required availability. 34 dBi gain, 4.0 kg incl. alignment unit. Antenna is produced by SAF Tehnika.
- 60 cm Parabolic antenna. Typically provides reliable operation for hops up to 12 km. 41 dBi gain, 8,5 kg incl. alignment unit. Antenna is produced by COMHAT (Sweden).
- 120 cm Parabolic antenna. Typically provides reliable operation for hops up to 15-18 km. 46 dBi gain, 45.5 kg incl. alignment unit. Antenna is

produced by COMHAT (Sweden).

General technical parameters

| | CFM-22L PRODUCTS | | |
|--|---|---|---|
| SPECIFICATION | For 8 Mbps products | For 16 Mbps products | For 34 Mbps products |
| General | | | |
| Frequency subbands | A: 22011.5 - 22298.5 MHz, 23019.5 - 23306.5 MHz B: 22305.5 - 22585.5 MHz, 23313.5 - 23593.5 MHz | | |
| Duplex spacing | 1008 MHz | | |
| Bit-rate/ Channel spacing/ Modulation | 8 Mbps/ 7 Mhz/ 4FSK | 16 Mbps/14 Mhz/ 4FSK | 34 Mbps/28 Mhz/4FSK |
| Channel capacity | 8 Mbps FDX | 16 Mbps FDX | 34 Mbps FDX |
| Frequency stability | +/- 10 PPM | | |
| Cable (IDU - ODU): single coaxial | Single up to 300 m long (LMR 400) or up to 100 long (RG-213), N-type connectors | | |
| Standard compliance | ITU, ETSI | | |
| Indoor Units | Ethernet Bridge IDU (REB, REB II), 4 slot MUX IDU (4x2 and flexible) | 8xE1, 4 slot MUX IDU, Remote Fast Ethernet Bridge | 16xE1, Fast Ethernet Bridge |
| Data interfaces ITU-R G.703 | BNC unbalanced and RJ45 balanced | SMB unbalanced or RJ45 balanced | SMB unbalanced or RJ45 balanced |
| Management | | | |
| Management | Local or remote, open TCP/IP based, Web, SNMP, Telnet/Terminal and IDU panel interface | | |
| Loop tests | Interfaces (E1, V.35), Baseband modem, Radio loopbacks | | |
| Transmitter | | | |
| Transmitter power | +16 dBm (+/-2 dBm), (0.04 W) +20 dBm (+/-2 dBm), (0.1 W) (HPO) | | |
| Transmitter power attenuator | 5, 10, 15 dB | | |
| Receiver | | | |
| Max. input power at antenna port | +15 dBm | | |
| Receiver thresholds at antenna port (guaranteed) | <-80.5 dBm (BER 10 ⁻⁶) <-84 dBm (BER 10 ⁻³) | <-78.5 dBm (BER 10 ⁻⁶) <-82 dBm (BER 10 ⁻³) | <-75.5 dBm (BER 10 ⁻⁶) <-79 dBm (BER 10 ⁻³) |
| Background BER (ETS EN 300 198 method) | <10 ⁻¹⁰ | | |
| Spurious emissions at antenna port | 30 MHz to 21.2 GHz: <-50 dBm 21.1 GHz to 55.0 GHz: <-30 dBm | | |
| Power consumption | | | |
| Power supply via IDU | 20 to 60 V DC, any polarity | | |
| Power consumption | 10 W | | |
| Mechanical parameters | | | |
| ODU Mechanical dimensions mm/ weight kg. | 210x200x80 mm, 1.6 kg | | |
| Waveguide flange | UBR-220 | | |
| Environmental | | | |
| Ambient Temperature | -33 °C to +40 °C | | |

