MM200
Multi-Rate Microwave Modem

For High Speed Applications
Data Rates to 200 Mbps

FEATURES

- Up to four user-selectable data/overhead interfaces
- 4, 16, 32, 64, 128 and 256 QAM operation
- Space diversity option
- Seamless hot-standby switching (optional)
- Ideal for new microwave links, upgrades or retrofits
- Wayside and/or overhead options
- Reed-solomon forward error correction
- Adaptive equalization
- Remote control from network or serial interface
- Companion to the Nucomm's FT6/FR6 microwave system

INTERFACES:

- G.703 DS3, E3 or STS-1*
- DVB ASI, SMPTE-310
- RS422 parallel, DVB parallel, M2P*
- LVDS parallel, DVB parallel, M2P*
- T1/E1 wayside
- OC3 optical, STM1/ STS3 electrical*

Nucomm
Microwave Solutions for the Digital Age™

MM200 Multi-Rate Microwave Modem:
Data Rates to 200 Mbps

Nucomm, Inc, is proud to introduce the MM200 Series Microwave Modem. This innovative and highly flexible platform is configurable for data rates between 1 and 200 Mbps. The unit allows complete control over modulation density and channel bandwidth for efficiencies up to 6 Bps/Hz. The unique architecture of the MM200's IF allows large improvements to fading and multi-path via multiple digital equalizers when used with the Nucomm FT6/FR6 microwave Transmitter and Receiver. The MM200 is an ideal solution for both new and retrofit microwave link installations. Maximum flexibility is achieved by an internal data multiplexer that combines up to four user selectable data paths into a single data stream. Interface choices for each include OC3 Optical, DS3, E3, STS-1, STM-1, SMPTE, DVB, ASI, Parallel, Overhead and T1/E1(Wayside). The IF can be field-configured with 1 to 4 channels providing total flexibility. Each channel can operate up to 7 Mbaud. The 2U chassis can be configured for simplex, duplex or space diversity.

Redundant switching is available. The Reed-Solomon decoder provides superior error correction while the adaptive equalizers provide superior protection from frequency selective fading and multi-path. Optional space diversity switching can provide higher than normal protection via the units ability to predict and switch before data errors occur.

Additional features include the choice of remotely interfacing through one of three onboard connections.

Ethernet (SNMP), RS485 or an externally-controlled RS232 terminal. The front panel offers push-button control of all features and a backlit LCD display. Menus are specifically designed for ease of use and quick online operation as well as changes in configuration.

Specifications: (*Front panel selectable)

Total Data Rate:	Variable from 1-200 Mbps total in 1 bps steps*
Note: Interface selection may limit maximum data rate.	
Total Baud Rate:	1-7, 1-14, 1-21 or 1-28 Mbaud depending upon number of IF channels installed
IF Channels:	1 to 4
IF Channel Baud Rate:	1 to 7 Mbaud Per Channel
IF Channel Spacing:	1.15 to 1.4 times channel baud rate 1.25 nominal*
Mux/Demux:	One to four* data channel DVB compliant
Modulation:	4, 16, 32, 64, 128, 256 QAM*
FEC:	204/188 Reed Solomon
FEC/Mux Overhead:	204/184 (204/188 for DVB framed interface)
Adaptive Equalizer:	12 tap DFE and 8 tap FFE (one per IF channel)
IF Range:	50 to 90 MHz*
IF Return Loss:	20 dB
Tx Output Power:	0 to –25 dBm in 0.1 dB steps*
Spurious Output:	-55 dBc in band
Rx Input Power:	0 to –25 dBm.
Frequency Stability:	10 ppm
Carrier Acquisition:	± 400 kHz or ± 10% of channel baud rate, whichever is less
Rx Data Buffer:	0 to ± 2 Mbits
Remote Control:	SNMP
RS485/232	
Modem Drives External Terminal	
Chassis Size:	2 RU (3.5")
Power:	85-264 Vac, 50/60 Hz
Environmental:	0-50˚C
Compliance:	CE

Options:

-48 Vdc
Simplex configuration, modulator only
Simplex configuration, demod only
Space diversity, demod only
Additional Mod IF channels.
Up to 4 per chassis
Additional Demod IF channels.
Up to 4 per chassis

Optional Data Interfaces:

G.703 T3, E3 or STS-1*
DVB ASI (normal or advanced)
RS422 Parallel, DVB Parallel, M2P*
LVDS Parallel, DVB Parallel, M2P*
OC3 Optical, STM1/ STS3 electrical*
SMPTE
(Other interfaces available upon request)

Note: Up to 4 interfaces per chassis. Any combination can be installed and operated by front panel control. Only one interface can be configured for DVB framed data.

Optional Overhead Interfaces:

Orderwire—can be configured for eight DS0s or seven DS0s plus one audio* wayside—T1 or E1*

How to calculate 3 dB Bandwidth of MM200 modulated carrier

1. Find combined interface data rate: DR_C = interface 1 data rate + interface 2 data rate + interface 3 data rate + interface 4 data rate

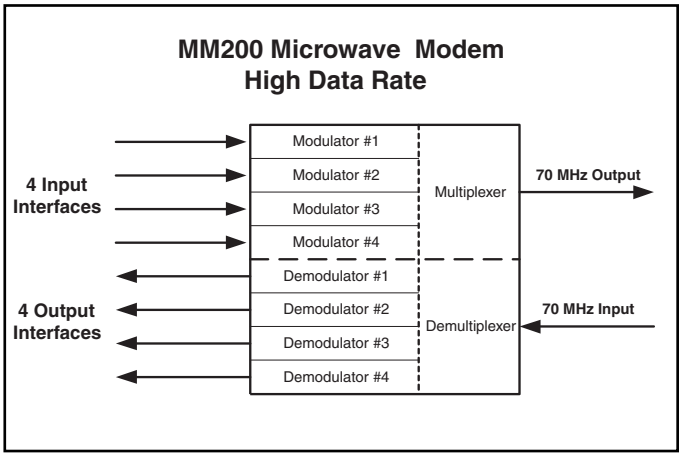
2. Find total data rate plus R/S and mux overhead: $DR_T + DR_C \times (204/184)$

3. Find channel baud rate: $BR_C = DR_T / (QAM \times N_C)$

Where Nc = number of channels (one to four)
And QAM = 2 for 4 QAM
4 for 16 QAM
5 for 32 QAM
6 for 64 QAM
7 for 128 QAM
8 for 256 QAM

4. Select channel spacing: C_S = from 1.15 to 1.4 times channel baud rate. This number is normally 1.25, but can be set to any number between 1.15 and 1.4.

5. Total 3 dB bandwidth = $BR_C \times C_S \times (N_C - 1) + BR_C$



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