EVOLUTION SERIES *ANSI*

Software Defined Radio: 5 - 40 GHz
Data-rate: 6 - 622 Mb/s

One wireless pipe for Ethernet and T1 traffic. Flexible and scalable with built in X-connect. GigaBit Ethernet or SONET OC3/OC12 interfaces. A variety of configuration options from single ended terminals to traffic nodes with four wireless directions. Managed by a standard web-browser - Nera's NetMaster or a general SNMP manager. One platform for all needs, simplifies logistics and dramatically reduces life cycle cost.

THE EVOLUTION PLATFORM

A carrier grade platform that is scalable and flexible to meet the need for low capacity demands such as 2G/3G/4G/WiMAX-backhaul networks and high capacity demands for Metro Ethernet or SONET transport and connectivity. The software core of the product allows flexible configuration choices between the T1, Ethernet and SONET interfaces. Cross-connect and route protection of T1 is available. Aggregation of Ethernet traffic using the built in layer-2 switch and SONET LCAS is used to combine traffic from several radios to allow a single pipe Ethernet channel up to 622Mb/s. Split-Mount and all Indoor solutions are available with up to 10 channels connected to one antenna. Hitless protection switching, Co-channel operation with XPIC, Space Diversity Combining and strong Error Correction are utilized to build highly reliable networks efficiently. A common ODU enables easy upgrade from low capacity to high capacity without climbing towers. Two types of IDUs are used. The Access IFU with maximum capacity of 100Mb/s and the Universal IFU with all features up to 622Mb/s. For capacities from 6 to 150Mb/s a proprietary mapping is used, and the software mode is called XPAND. Above 150 Mb/s SONET-mapping is used and the software mode is called METRO.

ACCESS IFU

The Access IFUs may be configured with capacity from 6 to 100Mb/s. This capacity may be flexibly shared between T1 and Ethernet. Two variants of the Access IFU are available. One has 4T1 and 2xFE interfaces and one has 16T1, 2FE and 1x64kbit/s interfaces. Non-protected and HSB-protected configurations are possible. Systems using these units are over the air compatible with the Universal IFU when configured consistently.

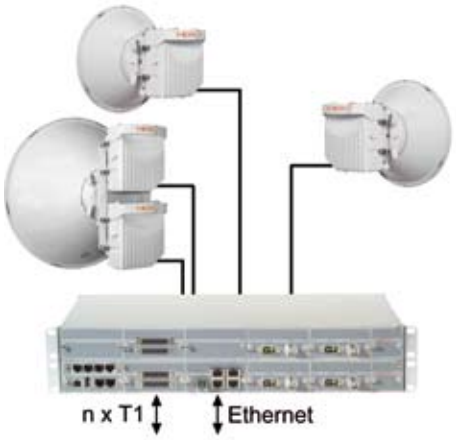
UNIVERSAL IFU

The Universal IFU may be configured with capacity from 6 to 600 Mb/s. Various plug-in units are available dependant on the selected configuration. Access to the different configurations is controlled by licenses. T1 and/or Ethernet traffic are mapped into Virtual Containers (VC) and an X-Connect is used to cross-connect between these VCs. The X-connect is built-in for systems up to 150Mb/s. For configurations above 150Mb/s (up to 622MB/s) the system is configured with SONET framing where user traffic is mapped into VT1.5 or VC-3 containers and a SONET DXC Unit is available to allow add/drop of traffic from the various directions. Non-protected, 2+0 and HSB-protected configurations are possible with the 1RU IFU. Several IFUs may be stacked to create larger traffic nodes. Co-channel operation with XPIC is available with the Universal IFU.

RADIO UNITS

The Transceiver units are frequency and data-rate agile. Each Transceiver can be used for all channels in a frequency band. Combined with a broadband diplexer or RF channel based branching solution they form a complete ODU or All Indoor solution. The ODU is either integrated or remotely connected to the antenna, both for non-protected and protected configurations (integrated solution for 1+0, 1+1 and 2+0). In Split Mount configurations, a single coaxial cable is used to connect each Transceiver to the IFU up to 1000ft/300m apart. The All Indoor solution is designed for 19" rack-mount. Up to 10 Transceivers and branching can be mounted in one rack together with IFUs. The waveguide interfaces for all Indoor configurations are at the top of the rack.

TECHNICAL SPECIFICATIONS - GENERAL:



User Interfaces – Access IFUs:

T1 interface - fixed:	4 or 16 x T1/100 ohm, D-type multi-connector
Ethernet:	2x10/100BaseT. Connectors: RJ45
NMS:	2x10/100BaseT. Connectors: RJ45
Aux channel (16T1-unit only)	1 x 64kb/s G.703/V.11. Connector: RJ45

User Interfaces – Universal IFU:

T1 plug-in-module:	8 or 16 x T1/100 ohm, D-type multi-connector (max 80xT1 I/O per terminal, non-protected or protected)
Ethernet & NMS (XPAND-mode):	2x10/100BaseT. Connectors: RJ45. USB for IP-configuration
Ethernet (METRO-mode):	3x10/100BaseT/RJ45 + 1x10/100/1000BaseT and a slot for 1x1000BaseFX (SFP). Connectors: RJ45
DS3 (METRO-mode):	3xDS3, 75ohm. Connectors: DIN 47297 1.0/2.3 mm
STS-3 (METRO-mode):	Electrical (G.703). Connectors: DIN47297 1.0/2.3mm
OC-3 (METRO-mode):	SR-0 (multimode) / S-1.1, L-1.1 or L-1.2 (G.957). Connectors: LC
OC-12 (METRO-mode):	IR-1/ S-4.1 (G.957). Connectors: LC
Wayside (METRO-mode):	1xT1 or 2Mb/s Ethernet. Connector: RJ45
DXC Unit (METRO-mode):	SONET cross-connect with 1.5 MHz synchronization interface. Connector: RJ45
Aux channel:	4 x 64kb/s G.703/V.11. Connector: RJ45 (maximum 2x64kb/s per air interface in XPAND-mode)
EOW:	2-wire handset, 2/4-wire east-west connection, selective call (utilizing 1x64kb/s AUX ch. if used)
Alarm in/out:	8x alarm-in / 4x alarm-out (relays) / 7 analog-in (common ground)

XPAND

Configurations – Universal IFU: Configurable from 6 Mb/s to 150 Mb/s, Non-protected up to 4 directions and HSB up to 2 directions
Configurations – Access IFU: Configurable from 6 Mb/s to 100 Mb/s, Non-protected and HSB in one direction
Architecture: Split Mount (All Indoor is also offered for some configurations – see Long Haul below)
User Interfaces: 2x10/100BaseT + nxT1
X-connect: Embedded X-connect for routing of T1 and/or Ethernet traffic (Universal IFU only)
Data-rate variants [T1/ Mb/s]: 4/6, 8/12, 14/22, 16/25, 32/50, 64/100, 80/125, 96/150

FREQUENCY BAND [GHz]:	4.4 – 5.0	5.9 - 6.4		6.4 – 6.9	7.1 – 7.7	7.1 – 7.7 / 7.7 – 8.5	10.55 10.68	10.7 – 11.7		
MODULATION [QAM]	64/128	128	64/32	128	16	128	128	64/16	128/64/32	128
CHANNEL BW [MHz]	40/30	29.65/9.88/5	29.65	30/20/10/5	5	30/20/10/5	5	40	30	10/5
DATA-RATE [Mb/s]	150	150/50/22	125/100	150/100/50/22	12	150/100/50/22	22	150/100	150/125/100	50/22
TX POWER [dBm] C'		+25	+26/+27	+25	+26	+24	+22	+22/+24	+22/+23/+24	+22
High Power option	+30	+30/+29/+29	+29/+29	+30/+29		+28	+26	+27/+26	+27/+26/+26	+26
RX TRESHOLD [dBm] BER 10^{-6}	-74/-71	-71/-75/-79	-75/-79	-71/-73/ -75/-79	-85	-71/-73/ -75/-79	-79	-73/-79	-71/-74/-78	-74/-79

FREQUENCY BAND [GHz]:	17.7 - 19.7 / 21.2 – 23.6						38.6 – 40.0	
MODULATION [QAM]	32/16	64/32/16	128/64/32/16	128/16/4	128/16/4	16/4	32/16	128/128/16/4
CHANNEL BW [MHz]	50	40	30	20	10	5	50	25
DATA-RATE [Mb/s]	150/125	150/125/100	150/125/100/50	100/50/25	50/25/12	12/6	150/125	125/100/ 50/25
TX POWER [dBm]	+20/+20	+19/+20/+20	+17/+19/ +20/+20	+17/+20/+20	+17/+20/+20	+20/+20	+16.5/ +18.5	+15.5/+15.5/ +18.5/+18.5
RX TRESHOLD [dBm] BER 10^{-6}	-74/-78	-72/-76/-80	-69/-73/-77/-83	-71/-83/-86	-73/-83/-89	-83/-90	-72/-75	-68/-69/-79/-84

METRO (SONET)

Configurations – Universal IFU: Up to four Radio-directions, Non-Protected or Protected (HSB). Co-channel with XPIC (option). Capacity is 155 Mb/s or 311 Mb/s per Radio Interface.
Architecture: Split Mount
User Interfaces: SONET-OC3/OC12, Ethernet (10/100/1000), 3xDS3 and 8 or 16 x T1 plug-in units
X-connect: SONET DXC (ADM from OC3 to VT1.5) is available as optional plug-in unit

FREQUENCY BAND [GHz]:	4.4 – 5.0	5.9 - 6.4	6.4 – 6.9	7.1 – 8.5	10.7 – 11.7	17.7-19.7 / 21.2-23.6		38.6 – 40.0	
MODULATION [QAM]	64/128	128	128	64/128	64/128	32/64/128	256	32	256
CHANNEL BW [MHz]	40/30	29.65	30	40/30	40/30	50/40/30	50	50	50
DATA-RATE [Mb/s]	155	155	155	155	155	155	311	155	311
TX POWER [dBm] C'	+30	+25 (+30*)	+25 (+30*)	+24 (+29*)	+22 (+27*)	+20/+19/ +17	+16	+16.5	+14.5
RX TRESHOLD [dBm] BER 10^{-6}	-74/-71	-71	-71	-74/-71	-73/-71	-74/-72/-69	-62	-72	-60

*High Power option

LONG HAUL- multi-channel system (PDH or SONET):

Configurations – Universal IFU: 1+0 up to 10+0, HSB, 1+1 Frequency diversity up to 7+1.
All configurations with option for Combiner Space Diversity and CCDP with XPIC.
Combiner Space Diversity requires the High Power option.
Architecture: All Indoor or Split Mount
Rack: 19" x 5.5ft or 7ft
User Interfaces: SONET-OC3/OC12, Ethernet (10/100/1000), 3xDS3 or 8 or 16 x T1 plug-in units
T1 Cross-Connect (XPAND): Built-in 4-port X-connect with optional protection on individual T1s
SONET Cross-Connect (METRO): ADM with add/drop from OC3 to VC3/VT1.5 is available as optional plug-in unit
VC3/VT1.5 can be configured with individual protection (SNCP)

FREQUENCY BAND [GHz]:	4.4 – 5.0	5.9 - 6.4	6.4 – 6.9	7.1 – 7.7	7.1 – 8.5	10.55– 10.68	10.7 – 11.7
MODULATION [QAM]	64/128	128	128	16	64/128	128	64/128/128/128
CHANNEL BW [MHz]	40/30	29.65/9.88/4.94	30/10/5	5	40/30	5	40/30/10/5
DATA-RATE [Mb/s]	155	155/50/22	155/50/22	12	155	22	155/155/50/22
TX POWER [dBm] (B')	+30	(+30*)/+25	(+30*)/+25	+26	(+28*)/+23	(+25*)/+20	(+25*)/+20
RX TRESHOLD [dBm] BER 10^{-6} (B)	-74/-71	-70/-74/-79	-70/-74/-79	-84	-72/-70	-76	-71/-68/-71/-76

*High Power option

Branching:	Loss B'-B [dB]	
Ch # on common polarization	Adj.ch on opposite polarization, or on same polarization with >30 MHz distance	Adj.ch on same polarization with ≤30 MHz distance
1 / 2 / 3 / 4	0.6 / 1.0 / 1.4 / 1.8	0.6 / 1.2 / 1.8 / 2.4
5 / 6 / 7 / 8	2.2 / 2.6 / 3.0 / 3.4	3.0 / 3.6 / 4.2 / 4.8
HSB (coupler)	Symmetrical: 6.8 / Asymmetrical: 3.0/13.0	Symmetrical: 6.8 / Asymmetrical: 3.0/13.0

TECHNICAL SPECIFICATIONS - GENERAL:

Data-rate: The ODU hardware supports data-rates up to 311 Mb/s. Easy upgrades by SW-licenses

Power Supply:
-48 (-40.5 to -57) VDC

Power Consumption (1+0):
Terminal 6-11 GHz SP, 1+0: average 65 W
Terminal 13-38 GHz, 1+0: average 52 W
Terminal 5-11 GHz HP, 1+1: average: 150W

Temperature Range (operational):
Indoor equipment: -5°C to +55°C (+23°F to +131°F)
Outdoor equipment: -33°C to +55°C (-27°F to + 131°F)

Weight and Dimensions:	IFU (1+0/HSB):	17.5" x 8.9" x 1RU / 444mm x 225mm x 44mm. Weight: 5.5 lbs / 2.5 kg
	ODU 6-11 GHz:	8.9" x 5.5" x 9.4" / 227mm x 140mm x 240mm. Weight: 17.7 lbs / 8.0 kg
	ODU 13-40 GHz:	8.1" x 5.2" x 8.3" / 206mm x 132mm x 210mm. Weight: 14.3 lbs / 6.5 kg
	All Indoor Rack:	standard 19" with height = 7ft.
Max Receive Level (BER<10-6):	5-18 GHz: -17dBm, 23-40 GHz -20dBm	
Coupler Loss:	Symmetrical coupler: 3.4 dB. Asymmetrical coupler: 1.5/6.5 dB	
Emission Designator:	[BW]M0D7W. Example: 23GHz in a 50MHz ch., EM=50M0D7W (BW figures from tables above)	

Antenna Interfaces – Split Mount:

Frequency band [GHz]:	5	L6/U6	7/8	10/11	18/23	39
Diplexer- and HSB-Coupler- Interface	Coaxial (N-connector)	PDR70	CBR84	CBR100	CBR220	CBR320
Matching Flanges/Interface	N-female connector	PDR70 / / CPR137G	UBR84 or PBR84	UBR100 or PBR100	UBR220 or PBR220	UBR320 or PBR320

Antenna Feeder Interfaces – All Indoor:

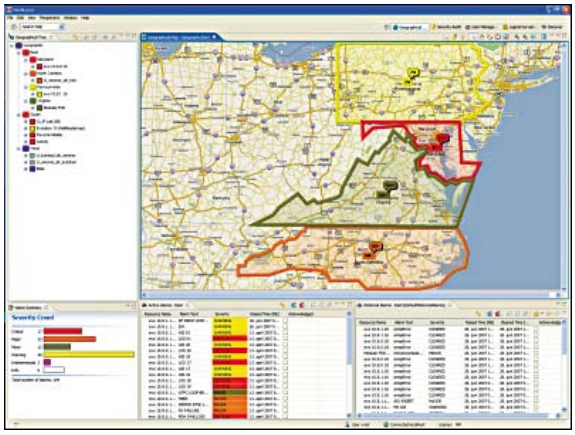
Frequency band [GHz]:	5	L6/U6	7/8	10/11
Branching Interface to Antenna-Feeder	PDR48	PDR70	PDR84	PDR100
Matching Flanges	PDR48 / CPR187G	PDR70 / CPR137G	PDR84 / CPR112G	PDR100 / CPR90G
Matching Waveguide	R48 / WR187	R70 / WR137	R84 / WR112	R100 / WR90

ANTENNAS – Integrated and Detached:

FREQUENCY BAND [GHz]:		5.9-6.9	7.1-8.5	10.7-11.7	17.7-19.7	21.2-23.6	37.0-40.0
Antenna Gain (centre) [dB]	1ft	-	-	-	34.0	35.3	40.1
	2ft	-	30.7	37.4 (2.5ft)	38.7	40.4	45.2
	3ft	-	33.9	-	41.0	43.0	-
	4ft	-	37.3	40.4	44.5	46.5	-
	6ft	39.4 (6.5ft)	40.8	43.6	47.8	49.3	-
	8ft /10ft	41.4 / 43.3	-	-	-	-	-

RADIO NETWORK MANAGEMENT

NetMaster is the Network Manager tailored for all Nera equipment. This is an optional tool for monitoring and control of equipment and traffic performance.



Highlights:

- Java based Client/Server solution
- Scalable based on licenses per network element
- SNMP is used between the NetMaster Server and the Elements
- Network grouping in geographical and/or logical areas
- SNMP Northbound interface for higher level network managers
- Report Generator
- Software upgrade scheduler (for the Elements)
- User friendly GUI based on Eclipse rich client platform

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