

NETNode IP Mesh Multiple Input/Multiple Output (MIMO) Radio (Robust)

COFDM – Video, Audio Telemetry and IP Products

March 2015 Data Sheet



DTC's NETNode IP mesh radios are the latest innovations in the expanding and successful range of the Tactical Communications and Surveillance NETNode IP Mesh family.

The Multiple Input/Multiple Output (MIMO) node is the latest breakthrough in mesh technology from DTC, offering multiple transmit and receive antennas, transmitting extra data on the same frequency by overlaying two signals in the space of one. This technique can provide either a power, or diversity gain. This gain can be used to either increase the transmission range, or increase data throughput making this node ideal as an IP Back bone provider within the system, or simply to increase data capacity in the MIMO mesh network.

The highly flexible mesh topology means that data can be exchanged between nodes in a point-to-point, or multi-point fashion and the range can be extended by using nodes as repeaters. The self-forming, self-healing mesh architecture makes the NETNode product ideal for use in mobile surveillance applications, command and control, or advanced robotics containing up to sixteen radios.

MIMO is a technique that is able to increase the network capacity of a single link in the same bandwidth and transmission power. Both the transmitter and the receiver are configured with multiple antennas. If multiple streams are transmitted in a "rich multipath scattering environment", these streams can be separated and decoded by the receiver successfully. Quad diversity further improves receive sensitivity by up to 3dB over dual diversity using Maximum Ratio Combining on all four channels. Further RX sensitivity can be achieved if the system is deployed with four sector antennas, to give a full 360 degrees of coverage.

DTC's standard NETNode mesh radios can provide over 9Mb/s of IP data (data rate dependent on mode, number of nodes and range between nodes), whereas the MIMO mesh radio is capable of over 16Mb/s of IP data.

The NETNode radios within the mesh exchange data on a single frequency, simplifying frequency management. The entire mesh occupies just 2.5MHz of bandwidth (3.0, 3.5, 5.0 and 6MHz). The NETNode radios employ the unique DTC COFDM modulation scheme and therefore offer excellent RF penetration and performance in the presence of multipath.

The Node itself is frequency band specific and includes two internal amplifiers (2W), which are selected and utilised at the transmit/receive site prior to onward conversion.

The nodes can be connected to third party cameras using the NETAV option. Alternatively, DTC offer PTZ camera solutions available for direct connection to the node: CAMPTZ* is a high performance, high quality day/night PTZ camera for long range and overt surveillance. The CAMPTZ* option requires the NETAVI option to be fitted.

Security of the entire mesh network can be ensured by the use of the optional AES128, or AES256 encryption.

Control of the deployed mesh is achieved using the inbuilt web browser or comprehensive Mission Commander PC application. This software suite, based around a mapping display, is used to configure and monitor the mesh and to control its nodes and cameras. Video can be viewed on the PC device using the Mission Commander software or, if IP Hardware Decoder devices are employed, video can be viewed on conventional monitors and recorded on conventional recorders.

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Specification:**Interfaces**

RF Interfaces (Antenna 4 off)	N-Type (f)
Power and Ethernet	Amphenol 38999 Series 3
Control and misc I/O	Amphenol 38999 Series 3
Camera (A/V)	Amphenol 38999 Series 3

Typical range

NETNode-MIMOR-217250	Non Line of Sight - Light urban 500- 700m	Line of Sight - 40km+
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RF Interfaces

Antenna 1	Horizontal antenna
Antenna 2	Horizontal antenna
Antenna 3	Vertical antenna
Antenna 4	Vertical antenna

RF and modulation

Output frequency	1.00-1.5GHz*, 1.65-2.38GHz, 2.17-2.50GHz, 4.4-5.0GHz
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Tuning step size

Output power	125kHz steps +33 to 0dBm in 0.25dB steps (2W) C-band 2W +/- 3dB
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Bandwidth

Mesh capacity	2.5, 3.0, 3.5, 5.0 and 6.0MHz
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Modulation

Carrier Modulation	Up to 16.0 Mb/s MIMO only
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Modulation

FEC rate	COFDM 360 carrier modulation
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Receive diversity

Receive sensitivity	BPSK, QPSK or 16QAM (adaptive) FEC1/2
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IP interface

Primary and secondary ethernet electrical	100BaseT Ethernet
IP address allocation	DHCP dynamic IP addressing
Video and audio streaming format	Multicast VLC compatible RTSP Support

A/V input option

Video input	Composite or SDI (selectable)
Video format	525 or 625 (PAL or NTSC)
Video encoding	MPEG4
Quality	User selectable quality level
Video bit-rate	2.4Mb/s to 50kb/s (variable)
Resolution	704, 576, 480 or 352
Frame rate	Self selecting 30 to 2F/s
Audio input	Line level or microphone level
Audio sample frequency	48KHz
Audio encoding	MPEG audio layer 1
Audio bit-rate	384 to 64kb/s

Store and forward option (with AVI option)

Storage format	SD card interface (Secure Digital card)
Record options	Continuous, or triggered
Files download	From web browser interface
Video and audio clip size	30 seconds

Open Audio comms channel (shared voice channel)

Multi-user audio comms channel	Interface microphone	level/headphone o/p
Compression	G726 32kbit audio	

Encryption

Type	AES128, or AES256 (optional)
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GPS

Dedicated GPS interface	RS232/RS485
Data interface	
RS232/RS485 data input (shared with user camera control)	1K2 to 115K2 baud switchable With UDP and TCP routing protocol

PTZ camera interface (with AVI fitted)

User camera type	PAL or NTSC
User camera control	From Mesh Commander PC application using VISCA, PELCOD or PELCO-P from any user supplied desk controller. Requires RS232 interface
Camera Option	CAMPZ long range Pan Tilt Zoom

Triggers

Trigger source	Third party equipment remote trigger (e.g. PIR, Nugget etc.) User pre-set time trigger Video motion detection (NETAV option) Audio level (NETAV)
Trigger action	Start to transmit (silence mode) Activate video stream (NETAV option) Activate audio stream (NETAV option) Move camera to preset position Activate local store feature

Control

Local control	LED power and mesh status (Bi colour)
Remote control	Mission Commander PC application Full control of all parameters in a map based application Web Browser

Physical

Sealing	IP66 Minimum
Dimensions	W 182 x H 75 x L 155mm
Mounting options base unit	Through hole screws on flange base.
Weight	2.25kg

Power

DC input	10.5-16.0V
Power consumed (2W)	
MIMO Mode	Nominal @ 1.8A = 21.6W
Quad Mode	Nominal @ 1.4A = 16.8W

Environment

Temperature range	-10 to 50 deg C
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Product Codes:

<i>NETNode-MIMOR-100150*</i>	<i>MIMO Robust IP Mesh Node 2W, 1.00-1.50GHz, excl ANTs & PSU</i>	
<i>NETNode-MIMOR-100150-AVI*</i>	<i>MIMO Robust IP Mesh Node with AVI 2W, 1.00-1.50GHz, excl ANTs & PSU</i>	
NETNode-MIMOR-165238	MIMO Robust IP Mesh Node 2W,	1.65-
2.38GHz, excl ANTs & PSU		
NETNode-MIMOR-165238-AVI	MIMO Robust IP Mesh Node with AVI 2W,	
1.65-2.38GHz, excl ANTs & PSU		
NETNode-MIMOR-217250	MIMO Robust IP Mesh Node 2W,	
	2.17-2.50GHz, excl ANTs & PSU	
NETNode-MIMOR-217250-AVI	MIMO Robust IP Mesh Node with AVI 2W,	
	2.17-2.50GHz, excl ANTs & PSU	
NETNode-MIMOR-440500	MIMO Robust IP Mesh Node 2W,	
	4.40-5.00GHz, excl ANTs & PSU	
NETNode-MIMOR-440500-AVI	MIMO Robust IP Mesh Node with AVI 2W,	
	4.40-5.00GHz, excl ANTs & PSU	

Product Code Includes

CA403	Power & Ethernet external cable 5m
CA406	Control & Data external cable 2m
CA2240	Headset adaptor cable 1m
CA0477	AV Cable 2m (<i>with AVI variant only</i>)

Accessory Options

NETNode-AVI-UP3R	Composite Video and Audio input for COFDM IP Mesh NETNode-R
PSU15/5	IP66 Power Supply, for NETNode-R
CAMP TZ	Pan, Tilt and Zoom camera for NETNode
MISC DRTAC	Mission Commander Tactical Control System (various levels available)
ANT2DSMIMO-220245	2dBi Omni Dual Slant Antenna, N-Type (f)
ANT2QSMIMO-220245	2dBi Omni Quad Slant Antenna, N-Type (f)
CA2534	N-Type/N-Type RG213 External RF Cable
1.5M for ANTs	
<i>ANT4QSMIMO-220245*</i>	<i>4dBi Omni Quad Slant Antenna, N-Type (f)</i>
Licensing Options	
AES128NN	128bit AES Encryption
AES256NN	256bit AES Encryption

Note: AES may be subject to export control

**Future releases*

Products are available to security users in licensed frequency bands. Encryption licences are subject to export control. These products are not approved for use by unlicensed users. Commercial products are available if used in appropriate licensed frequency bands.

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