COMMSCOPE®

TETRA/TETRAPOL

Technical Brochure

A universal choice for simultaneous band- or channel selective transmission of multiple TETRA and TETRAPOL frequency bands.

Node A+ TETRA/TETRAPOL

Universal Multi-Band, Multi-Service, Software-Based Repeater Platform

Coverage Solution for Mission Critical Tetra and Tetrapol Networks

- Supports up to four frequency bands in a single chassis with fully integrated multi-band combiner and modem for remote monitoring and control.
- Software-based platform enables on-the-fly filter changes and development of new features and capabilities without expensive hardware upgrades.
- Channel and band selective automatic gain/power control for public-operator and public safety applications.
- Available in high power classes to enhance coverage in a wide range of facility footprints to optimize total system cost.
- Intuitive local and remote access supported by help screens for easy system configuration, minimizing setup time and reliance on expensive and bulky test equipment.
- Advanced QoS measurements and reports, including inbound and outbound measurement of channel power/RSSI to facilitate set up and verify ongoing system operation.
- Remote alarming through SNMP or SMS using wireless data.
- Seamless integration with other Andrew products (e.g., ION®-B/ION®-M/ION®-U/ION®-E).
- Rated for both indoor and outdoor use with versatile rack mount, wall mount, or pole mounting options.
- Uplink muting for unused narrowband channels in order to avoid uplink desensitization of BTS receivers.
- Enhanced network security features such as openVPN, SNMPv3, firewall protection and up-to-date software components.

Node A+ RF Enhancer – TETRA/Tetrapol Specifications

Electrical[1]

Number of supported RF cards (see table 1)

Node A2+	2
Node A4+	4

Frequency range and RF output power	see table 1

Number of supported channels per rack

Node A2+	12
Node A4+	24

Number of supported sub-bands per rack

Node A2+	4*
Node A4+	8*

Bandwidth available in Uplink and Downlink per rack

Node A2+	Narrowband low-delay sub-bands (see table 2)	34 to 214 kHz
	Wideband sub-bands (see table 3)	up to 20 MHz
Node A4+	Narrowband low-delay sub-bands (see table 2)	34 to 214 kHz
	Wideband sub-bands (see table 3)	up to 40 MHz

Gain in Uplink and Downlink	see table 1
Gain adjust range, dB	30 in steps of 1
Filter selection step size, kHz	10
Output Power step size in Powermode, dB	1
Output Power accuracy over all conditions, dB	±2
Maximum Input Power without damage, dBm	+10
Maximum Input Power without overdrive, dBm	-20

P-1dB, dBm

Uplink	+35
Downlink	+42

OIP3, dBm

Uplink	+52
Downlink	+63

Noise figure

@ maximum gain, dB	Uplink	4.0
	Downlink	4.0
@ minimum gain, dB	Uplink	6.0
	Downlink	12.0

Delay, µs	Narrowband low-delay sub-bands (see table 2) (depending on filter type)	9 to 36
	Wideband sub-bands (see table 3) (Standard filter set)	6
Power supply	Standard	100 to 240 Vac
	Option	36 to 72 Vdc

Power consumption, Watts

Node A2+ chassis	70
Node A4+ chassis	120
RF card	145

Antenna port connectors	N Female
Spurious Emissions, dBm	acc. to ETSI TS 101789-1

* Valid for sub-band bandwidth up to 5MHz.

Mechanical[1]

Height, width, depth, mm (in)

Node A2+	177.0 x 351.2 x 462.8 (7 x 13.8 x 18.2)
Node A4+	177.0 x 482.3 x 462.8 (7 x 19 x 18.2

Weight, kg (lb)

Node A2+	11 (24)
Node A4+	14 (30.8)
RF card	4.5 (10)

Environmental[1]

Operating temperature range, °C	-33 to +50
Ingress protection	IP65 (Fans: IP55)
Acoustic Noise, dB(A)	47 @ 25°C
	55 @ 50°C

[1] All figures are typical values. Electrical values refer to the antenna ports of the RF card. The loss of the integrated RF combiner section (Option) is typically 0.5 to 1.0 dB.

Features

Items measured	Measurement of channel power, RSSI, and system identification.
Statistic Collection	Collecting data (min., max., average, standard deviation) of items measured in a 15 minutes interval.
Access	Web browser based local access and remote access. Packet data and circuit switched data options. OMC connectivity via SNMP.
External alarms	Up to 5 alarms, active high or low configurable via software.
Uplink Muting	Gain reduction of unused timeslots of channels in order to avoid Uplink desensitization of BTS receiver.
Interference Analysis Database	Event triggered database to identify interference signals in terms of frequency, power level, duration, etc.

Table 1: RF card options

Modulation Scheme	RF Card	UL Frequency, MHz	DL Frequency, MHz	Max. Gain, dB	Uplink Composite Output Power, dBm*	Downlink Composite Output Power, dBm*
TETRA/Tetrapol 450	AF 436	380 to 385	390 to 395	85	24	36
		385 to 390	395 to 400	85	24	36
		410 to 415	420 to 425	85	24	36
		412 to 417	422 to 427	85	24	36
		415 to 420	425 to 430	85	24	36
		450 to 455	460 to 465	85	24	36
		452.5 to 457.5	462.5 to 467.5	85	24	36
		455 to 460	465 to 470	85	24	36
TETRA 800	AF 8036	806 to 824	851 to 869	85	24	36

* Output power per carrier (dBm) = composite output power (dBm) - 10 x log (no. of carriers)

For operating frequency band greater 1 MHz in low-delay mode, the following restrictions apply:

- Max. gain: 80 dB
- Max. composite output power in the three 25 kHz channels located at the band edges is reduced by 2 dB, Uplink: 22 dBm, Downlink: 34 dBm

Detailed System Description

The Node A+ RF Cards convert the RF into digital signals and transfer the digital signals to the Node A+ rack where the overall digital filtering is done for all RF Cards. The available FPGA resources, which perform the channel/sub-band filtering, are shared between all RF Cards inserted in the Node A+ rack. The Node A2+ can provide up to 12 channels, where 9 different filter types can be chosen and 4 filter resources (up to 5 MHz each) for band-selective transmission.
The Node A4+ is capable of up to 24 channels and 8 filter resources. When the sub-band bandwidths are greater than 5MHz the filter resources are grouped together, without phase or amplitude ripple, where the sub-band is defined by a start and stop frequency. The total number of filter resources required is determined by adding the number of filter resources required for each sub-band. For example, if there are two sub-bands with 4 MHz for the first sub-band and 11 MHz for the second sub-band, then 1 filter resource is required for the first sub-band and 3 filter resources are required for the second sub-band. The totals number of filter resources required is 4. However, the maximum available bandwidth (Node A2+ 20 MHz, Node A4+ 40 MHz) will only be achieved with sub-band bandwidths of multiple 5 MHz.

Table 2: Bandwidth available in UL and DL per rack (narrowband low-delay)

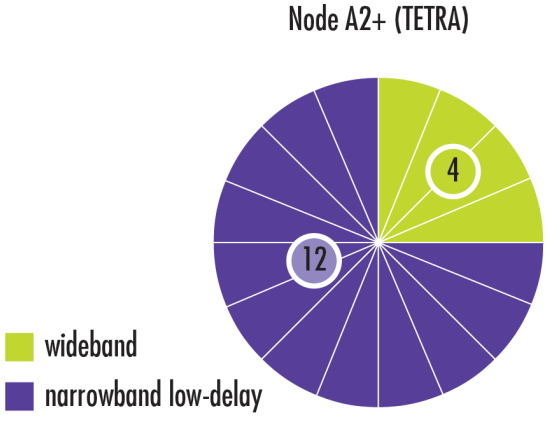
TETRA channel 3 dB BW [kHz]	Delay (µs)	Filter Resource
34	36	1
58	24	1
79	18	1
104	15	1
125	13	1
146	11	1
171	10	1
192	9	1
214	9	1

Table 3: Bandwidth available in UL and DL per rack (wideband)

Sub-Band Bandwidth [MHz]	Delay (µs)	Filter Resources
0.01 to 5.00	6	1
5.01 to 10.00	6	2
10.01 to 15.00	6	3
15.01 to 20.00	6	4
20.01 to 25.00	6	5*
25.01 to 30.00	6	6*
30.01 to 35.00	6	7*
35.01 to 40.00	6	8*

* Node A4+ only

Examples: *Available Filter Resources (up to 5 MHz wide)*



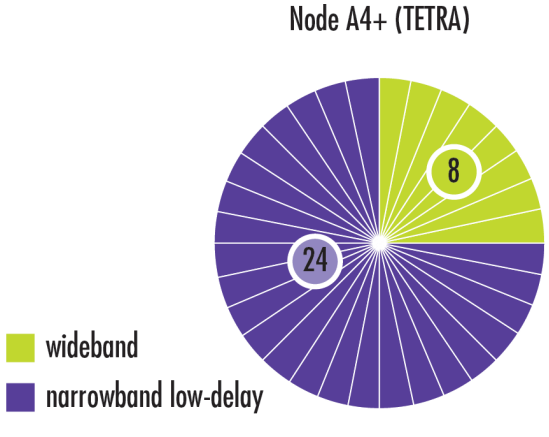


Table 4: Node A+ TETRA Ordering Guide

	Description		Part-Number
Required	System rack:	Node A2+	7640794
		Node A4+	7640793
Required	Power supply:	Power supply unit AC IN 100-240V	7605769-00
		Power supply unit DC IN 48V	7609268-00
Optional	Software features:	SW feature key Node A+: 1 TETRA channel / sub-band 1 slot	7597540
		SW feature key Node A+: up to 2 TETRA channels / sub-bands 1 slot	7597572
		SW feature key Node A+: up to 2 TETRA channels / sub-bands 2 slots	7597541
		SW feature key Node A+: up to 2 TETRA channels / sub-bands 3 slots	7597542
		SW feature key Node A+: up to 2 TETRA channels/ sub-bands 4 slots	7597543
		SW feature key Node A+: up to 3 TETRA channels / sub-bands 1 slot	7608798
		SW feature key Node A+: up to 3 TETRA channels / sub-bands 2 slots	7608799
		SW feature key Node A+: up to 3 TETRA channels / sub-bands 3 slots	7608800
		SW feature key Node A+: up to 3 TETRA channels / sub-bands 4 slots	7608811
		SW feature key Node A+: up to 12 TETRA channels and 4 sub-bands (Node A2+)/ up to 24 TETRA channels and 8 sub-bands (Node A4+) 1 slot	7597571
		SW feature key Node A+: up to 12 TETRA channels and 4 sub-bands (Node A2+)/ up to 24 TETRA channels and 8 sub-bands (Node A4+) 2 slots	7597544
		SW feature key Node A+: up to 12 TETRA channels and 4 sub-bands (Node A2+)/ up to 24 TETRA channels and 8 sub-bands (Node A4+) 3 slots	7597545
		SW feature key Node A+: up to 12 TETRA channels and 4 sub-bands (Node A2+)/ up to 24 TETRA channels and 8 sub-bands (Node A4+) 4 slots	7580897
Required . at least one	RF cards	DCM AF 436 (Uplink 380 to 385 MHz / Downlink 390 to 395 MHz)	7575751-00 / -01
		DCM AF 436 ((Uplink 385 to 390 MHz / Downlink 395 to 400 MHz)	7599725-00 / -01
		DCM AF 436 (Uplink 410 to 415 MHz / Downlink 420 to 425 MHz)	7596235-00 / -01
		DCM AF 436 (Uplink 412 to 417 MHz / Downlink 422 to 427 MHz)	7660122-01
		DCM AF 436 (Uplink 415 to 420 MHz / Downlink 425 to 430 MHz)	7596234-00 / -01
		DCM AF 436 (Uplink 450 to 455 MHz / Downlink 460 to 465 MHz)	7607816-00 / -01
		DCM AF 436 (Uplink 452.5 to 457.5 MHz / Downlink 462.5 to 467.5 MHz)	7629033-01
		DCM AF 436 (Uplink 455 to 460 MHz / Downlink 465 to 470 MHz)	7643116-00 / -01
		DCM AF 8036 (Uplink 806 to 824 MHz / Downlink 851 to 869 MHz)	7606748-00 / -01
Optional	Number of dummy cards	Each empty slot must be filled with a dummy card	7574285-00
Optional	RF combiner section with integrated modem coupler:	1-way-combiner (350-3500 MHz)	7574290
		1-way-combiner (350-3500 MHz) with external modem port	7609689
		2-way-combiner (350-550/698-2700 MHz)	7577520
		2-way-combiner (380-470/380-470 MHz) non-adjacent	on request
Optional	Modem for alarm forwarding*	MC88 (GSM 850/900/1800/1900)	7641901
		MC75 (GSM/EDGE 850/900/1800/1900)	7641900
		PHS8 (GSM/EDGE 850/900/1800/1900, UMTS 800/850/900/1900/2100)	7679539
		TRM5 (GSM-R)	7693459
Optional	Mounting options	19" rack mounting Node A2+	7598847-00
		Wall mounting kit Node A2+ Outdoors	7597819
		Pole mounting kit Node A2+	7597823
		Wall mounting kit Node A2+ and A4+	7597821
		19" rack mounting Node A4+ (included in basic configuration)	
		Wall mounting kit Node A4+ Outdoors	7597820
		Pole mounting kit Node A4+	7597825

* TETRA modem CE 100 TMS of external vendor IDS supported by SW

Note: A pre-configured system rack including power supply, RF combiner section, modem, number of supported RF cards, and number of supported sub-bands, channels can be ordered with one single part number. Contact your local Andrew Solutions sales representative to order with a single part number.

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