COMMSCOPE®

Node A+ Public Safety

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

A universal choice for simultaneous band- or channel selective transmission of multiple Public Safety frequency bands.

ENSURING RELIABLE, UBIQUITOUS RF COVERAGE FOR MISSION CRITICAL PUBLIC SAFETY NETWORKS

To meet the rigorous demands of mission critical public safety networks and changing in-building coverage ordinances for firefighters, police, and other first responders, CommScope has developed the Node A+, a flexible, modular, cost-effective digital off-air signal booster platform. The Node A+ is an universal solution that is ideal for the transmission of analog or digital multiplex public safety frequency bands including Tetra, Tetrapol, LMR, and APCO25, even in the most demanding application environments. In addition to being already an efficient and low-cost alternative to base stations, the Node A+ can be shared with commercial frequency bands which reduces CAPEX and OPEX even more.

- Supports up to two (Node A2+) and up to four (Node A4+) 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 control for public-operator and public safety applications.
- Optimized characteristics of filter with excellent rejection guarantees communication at dedicated channel and allows operation in areas with densely deployed frequency spectrums due to high suppression even at adjacent channel frequencies.
- Uplink muting for unused narrowband channels in order to avoid uplink desensitization of BTS receivers.
- 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 statistic reports, including inbound and outbound measurement of channel power/RSSI to facilitate set up and verify ongoing system operation.
- Optional automatic adaptation of configuration and setting of outputs based on condition of donor connection to switch to alternative configuration / donor link.
- Remote alarming through SNMP or SMS using wireless data.
- Enhanced network security features such as openVPN, SNMPv3, HTTPS, firewall protection and up-to-date software components.
- Seamless integration with optical DAS, e.g. ION®-M product line.
- Rated for both indoor and outdoor use with versatile rack mount, wall mount or pole mounting options.

Node A+ Public Safety – Product Specifications

Electrical[1]

Number of supported RF cards (see table 1)
Node A2+ . . . . . 2 [2]
Node A4+ . . . . . 4 [2]
Frequency range and RF output power . . . . . see table 1

Number of supported narrowband sub-bands per rack
Node A2+ 16
Node A4+ 32

Number of supported narrowband low-delay sub-bands per rack
Node A2+ 8
Node A4+ 16

Number of supported wideband sub-bands per rack
Node A2+ . . . . . 4[3]
Node A4+ . . . . . 8[3]

Bandwidth available in Uplink and Downlink per rack
Node A2+ Narrowband sub-bands (see table 2) . . . . . 6.25 to 331.25 kHz
Narrowband low-delay sub-bands (see table 3) 32 to 214 kHz
Wideband sub-bands (see table 4) . . . . . up to 20 MHz
Node A4+ Narrowband sub-bands (see table 2) . . . . . 6.25 to 331.25 kHz
Narrowband low-delay sub-bands (see table 3) 32 to 214 kHz
Wideband sub-bands (see table 4) . . . . . 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
Narrowband sub-bands 6.25
Narrowband low-delay sub-bands 10
Wideband sub-bands 200

Output Power step size in Powermode, dB 1

Output Power accuracy over all conditions, dB . . . ±2

Maximum Input Power without damage, dBm . . . . +10

Noise figure
@ maximum gain, dB Uplink 4.0
Downlink 4.0
@ minimum gain, dB **Uplink 6.0**
Downlink 12.0

Delay, µs
Narrowband sub-bands (see table 2)
(depending on filter type). . . . . 10 to 204

Narrowband low-delay sub-bands (see table 3)
(depending on filter type). . . . . 9 to 40

Wideband sub-bands (see table 4)
(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 Narrowband sub-bands . acc. to FCC
Narrowband low-delay sub-bands acc. to EN302561
Wideband sub-bands . . . . . **acc. to 3GPP**

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)
LMR 450 Duplexer Rack . . . 177.0 x 482.3 x 469.5 (7 x 19 x 18.5)

Weight, kg (lb)
Node A2+ 11 (24)
Node A4+ 14 (30.8)
RF card . . . . . 4.5(10)
LMR 450 Duplexer Rack 24 (53)

Environmental[1]

Operating temperature range, °C . . . . . -33 to +50

Ingress protection Node A+/RF Cards IP65
LMR 450 Duplexer Rack . IP50

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.
[2] DCM AF 436 (380-386.5/390-396.5) requires 2 slots due to external duplexer
[3] Valid for sub-band bandwidth up to 5 MHz.

Features

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.
Summary alarm . . . . . Status indication via LED and relay contact.
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.
Uplink muting . . . . . Gain reduction of unused time slots of channels in order to avoid Uplink desensitization of BTS receiver.
Filter characteristics . . . . . High rejection filters guarantee sufficient attenuation of adjacent unwanted channels considering optimized delay and ripple.
Integrated spectrum analyser . . . . . Snapshot of received and transmitted RF-spectrum.

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
		380 to 386.5	390 to 396.5	85	24	36
		385 to 390	395 to 400	85	24	36
		410 to 415	420 to 425	85	24	36
		415 to 420	425 to 430	85	24	36
		452.5 to 457.5	462.5 to 467.5	85	24	36
LMR 450	AF4037	455 to 470	450 to 465	85	27	37
LMR 700	AF7037	788 to 824	758 to 776	94	30	37
LMR 800	AF8037	806 to 824	851 to 869	94	30	37
LMR 900	AF9037	896 to 902	935 to 941	94	30	37

* 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 16 narrowband sub-bands, where 106 different filter types can be chosen, 8 narrowand low-delay and 4 wideband sub-bands (up to 5 MHz each) for band-selective transmission. The Node A4+ is capable of up to 32 narrowband, 16 narrow-band low-delay and 8 wideband sub-bands. When the sub-band bandwiths are greater than 5 MHz, 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 total number of filter resources required is 4. However, the maximum available bandwith (Node A2+ 20 MHz, Node A4+ 40 MHz) will only be achieved with sub-band bandwidths of mutiple 5 MHz.

TABLE 2: BANDWITH AVAILABLE IN UL AND DL PER RACK (1 narrowband channel requires one filter resource)

NB CHANNEL Bandwith (kHz)	Delay (µs)	NB channel Bandwith (kHz)	Delay (µs)	NB channel Bandwith (kHz)	DELAY (µs)	NB channel Bandwith (kHz)	Delay (µs)
6.25	204,162	93.75	20, 17	181.25	14, 12	268.75	11, 11
12.5	102, 86	100	19, 17	187.5	13, 12	275	11, 10
18.75	71, 60	106.25	18, 16	193.75	13, 12	281.25	11, 10
25	55, 46	112..5	18, 16	200	13, 12	287.5	11, 10
31.25	45, 39	118.75	17, 15	206.25	13, 12	293.75	11, 10
37.5	39, 33	125	17, 15	212.5	13, 12	300	11, 10
43.75	34, 30	131.25	16, 14	218.75	12, 11	306.25	11, 10
50	31, 27	137.5	16, 14	225	12, 11	312.5	11, 10
56.25	28, 25	143.75	15, 14	231.25	12, 11	318.75	11, 10
62.5	26, 23	150	15, 14	237.5	12, 11	325	11, 10
68.75	24, 21	156.25	15, 13	243.75	12, 11	331.25	10, 10
75	23, 20	162.5	14, 13	250	12, 11		
81.25	22, 19	168.75	14, 13	256.25	12, 11		
87.5	21, 18	175	14, 13	262.5	11, 11		

TABLE 3: BANDWITH AVAILABLE IN UL AND DL PER RACK (narrowband low-delay)

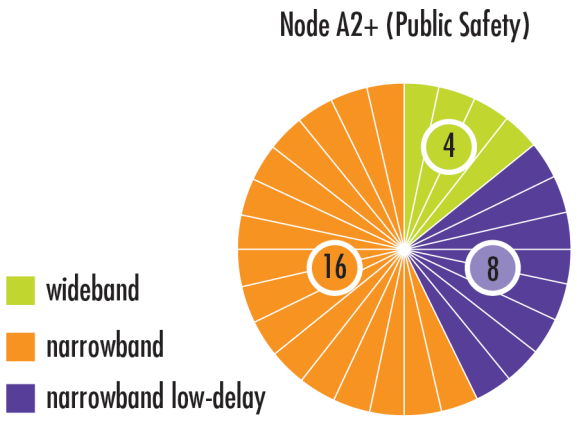
TETRA channel 3dB BW (kHz)	Delay (µs)	Filter Resource
32	40	1
58	24	1
79	18	1
104	15	1
125	13	1
146	11	1
171	10	1
192	9	1
214	9	1

TABLE 4: BANDWITH AVAILABLE IN UL AND DL PER RACK (wideband)

Sub-Band Bandwith (MHz)	Delay (µs)	Filter Resource
0.20 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)



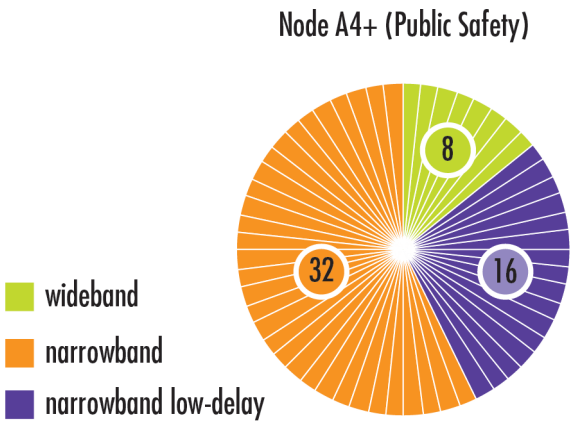


TABLE 5: Node A+ Public Safety Ordering Guide

	DESCRIPTION		PART NUMBER
Required	System Rack:	Node A2+	7640794
		Node A4+	7640793
Required	Power supply:	Power supply unit AC IN 100-240 V	7605769-00
		Power supply unit DC IN 24-110 V	7711908-00
Optional	Software Features:	SW feature key Node A+: 1 sub-band 1 slot	7597540
		SW feature key Node A+: up to 4 sub-band 1 slot	7597572
		SW feature key Node A+: up to 4 sub-band 2 slots	7597541
		SW feature key Node A+: up to 4 sub-band 3 slots	7597542
		SW feature key Node A+: up to 4 sub-band 4 slots	7597543
		SW feature key Node A+: up to 8 sub-band 1 slot	7608798
		SW feature key Node A+: up to 8 sub-band 2 slots	7608799
		SW feature key Node A+: up to 8 sub-band 3 slots	7608800
		SW feature key Node A+: up to 8 sub-band 4 slots	7608811
		SW feature key Node A+: up to 16 narrowband sub-bands, 8 narrowband low delay sub-bands and 4 wideband sub-bands (Node A2+)/ up to 32 narrowband sub-bands, 16 narrowband low-delay sub-bands and 8 wideband sub-bands (Node A4+) 1 slot	7597571
		SW feature key Node A+: up to 16 narrowband sub-bands, 8 narrowband low delay sub-bands and 4 wideband sub-bands (Node A2+)/ up to 32 narrowband sub-bands, 16 narrowband low-delay sub-bands and 8 wideband sub-bands (Node A4+) 2 slots	7597544
		SW feature key Node A+: up to 16 narrowband sub-bands, 8 narowband low delay sub-bands and 4 wideband sub-bands (Node A2+)/ up to 32 narrowband sub-bands, 16 narrowband low-delay sub-bands and 8 wideband sub-bands (Node A4+) 3 slots	7597545
		SW feature key Node A+: up to 16 narrowband sub-bands, 8 narrowband low delay sub-bands and 4 wideband sub-bands (Node A2+)/ up to 32 narrowband sub-bands, 16 narrowband low-delay sub-bands and 8 wideband 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)	7575751-01
		DCM AF 436 (Uplink 380 to 386.5 MHz / Downlink 390 to 396.5 MHz)*	7813090-00
		DCM AF 426 (Uplink 385 to 390 MHz / Downlink 395 to 400 MHz)	7599725-01
		DCM AF 436 (Uplink 410 to 415 MHz / Downlink 420 to 425 MHz)	7596235-01
		DCM AF 436 (Uplink 415 to 420 MHz / Downlink 425 to 430 MHz)	7596234-01
		DCM AF 436 (Uplink 452.5 to 457.5 MHz / Downlink 462.5 to 467.5 MHz)	7629033-01
		DCM AF 4037 (Uplink 455 to 470 MHz / Downlink 450 to 465 MHz	7602541-01
		DCM AF 7037 (Uplink 788 to 824 MHz / Downlink 758 to 776 MHz)	7577534-01
		DCM AF 8037 (Uplink 806 to 824 MHz / Downlink 851 to 869 MHz)	7577538-01
		DCM AF 9037 (Uplink 896 to 902 MHz / Downlink 935 to 941 MHz)	7577546-01
Optional	Number of dummy cards	Empty slot must be equipped with a dummy card	7574285-00
Optional	RF combiner with integrated modem coupler:	1-way-combiner (350-3500 MHz)	7574290
		1-way-combiner (350-3500 MHz) external modem port	7609689
		2-way-combiner (758-824/849-869 MHz	760087
Optional	Modem for alarm forwarding*	PLS8-X (GSM/EDGE 850/900/1800/1900, UMTS 850/1700/1900, LTE 700/850/1700/1900)	7768699-00
		PHS8 (GSM/EDGE 850/900/1800/1900, UMTS 800/850/900/1900/2100)	7679539
		TRM5 (GSM-R)	

TABLE 5: Node A+ Public Safety Ordering Guide (continued)

	DESCRIPTION		PART NUMBER
Optional	Mounting options	19" rack mounting Node A2+	7598847-00
		Wall mounting kit Node A2+ outdoors	7597819[3]/7835420[4]
		Pole mounting kit Node A2+	7597823[3]/7835407[4]
		Wall mounting kit Node A2+ and A4+	7597821
		19" rack mounting Node A4+ (included in basic configuration)	
		Wall mounting kit Node A4+ outdoors	7597820[3]/7835409[4]
		Pole mounting kit Node A4+	7597825[3]/7835408[4]
Required per DCM 4037	LMR 450 duplexer rack	Node A+ duplexer rack 440-444 and 445-449 MHz	7605118-0019
		Node A+ duplexer rack 455-459 and 450-454 MHz	7605118-0001
		Node A+ duplexer rack 456-460 and 451-455 MHz	7605118-0002
		Node A+ duplexer rack 458-462 and 453-457 MHz	7605118-0021
		Node A+ duplexer rack 465-469 and 460-464 MHz	7605118-0003
		Node A+ duplexer rack 466-470 and 461-465 MHz	7605118-0004

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.
[1)] TETRA modem CE 100 TMS from external vendor IDS supported by software
[2)] Separate slot for duplexer required
[3)] Mounting kit with 7/16 connectors
[4)] Mounting kit with 4.3-10 connectors

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