



Bi-Directional Amplifier (BDA)

Cost effective and flexible radio communication solutions, for coverage in challenging environments.

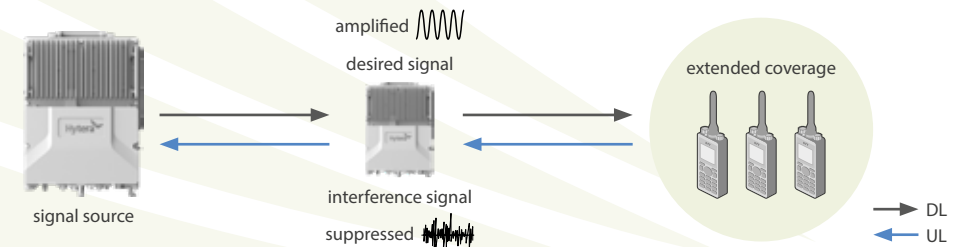




BDA's are a cost effective and flexible way to:

- Overcome challenges presented by environments like high-rise buildings, basements, tunnels, subways, etc.
- Extend coverage
- They can be used in many different systems, such as Analogue PMR/MPT, Digital DMR Conventional/Trunked, TETRA, etc.

- BDA**
- Wireless emission transfer device (RF signal amplifier)
 - Signal coverage for blind/weak signal area to extend coverage, such as inside buildings, tunnels, subways, etc.
 - Small capacity with large coverage
 - Cost effective and flexible



Overview

A BDA (Bi-Directional Amplifier) is an RF signal booster used to improve radio communications in situations where radio signal levels are degraded due to obstacles in the radio path. This might be in tunnels, high rise buildings and underground car parks where their construction can prevent the signals from a source reaching the users in these areas.

They are available in a number of variants to suit the communications situation, this includes integrated and distributed configurations and band and channel select options.



Large buildings



Shopping centres



Transport hubs



Metros and tunnels



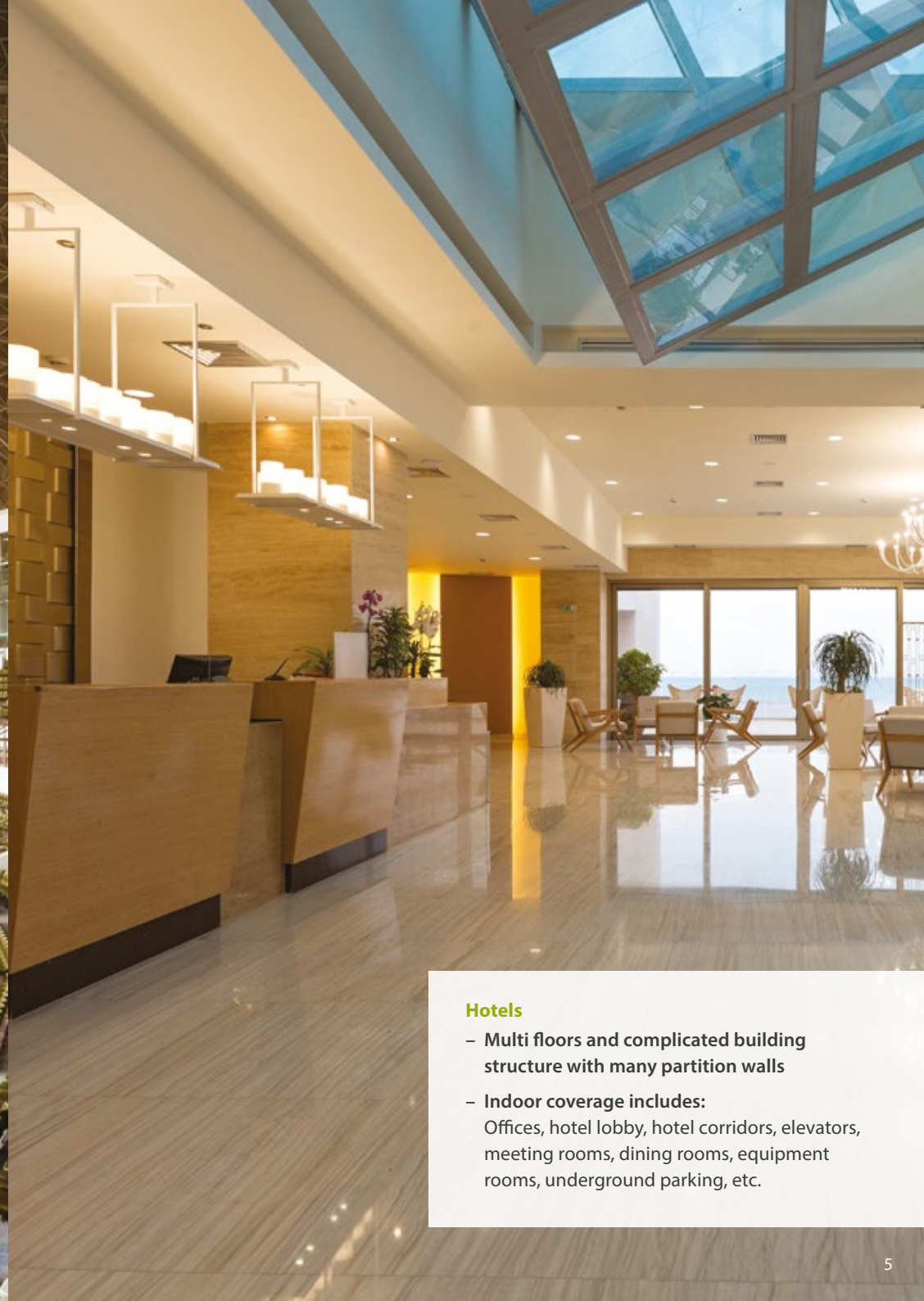
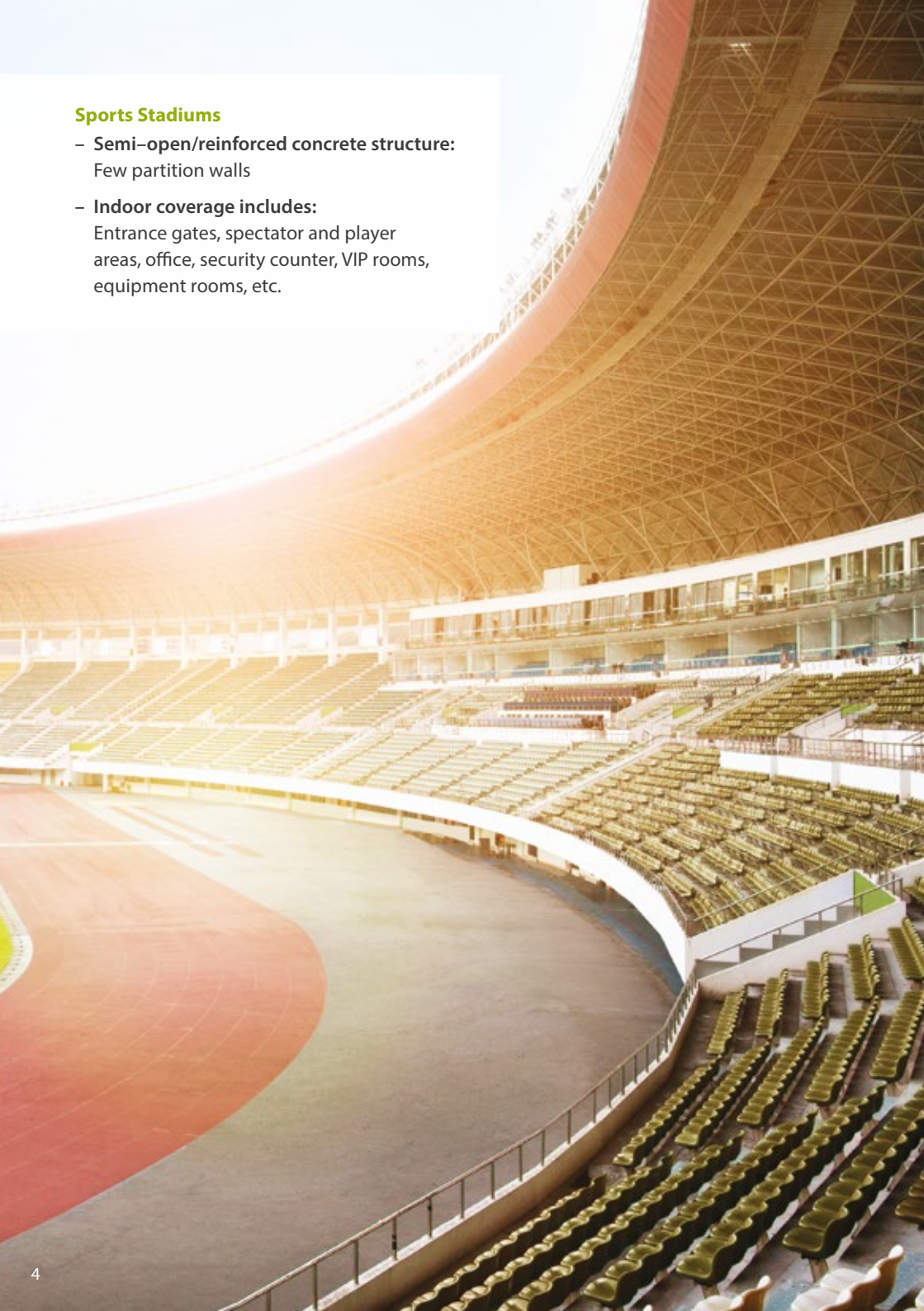
Underground car parks



Elevators

Sports Stadiums

- Semi-open/reinforced concrete structure:
Few partition walls
- Indoor coverage includes:
Entrance gates, spectator and player areas, office, security counter, VIP rooms, equipment rooms, etc.



Hotels

- Multi floors and complicated building structure with many partition walls
- Indoor coverage includes:
Offices, hotel lobby, hotel corridors, elevators, meeting rooms, dining rooms, equipment rooms, underground parking, etc.

Transport Hubs

- Semi-open/reinforced concrete structure:
Few partition walls; high ceiling, etc.
- Indoor coverage includes:
Offices, waiting rooms, security counter,
VIP rooms, stores, equipment rooms,
underground parking, etc.



Metros and Tunnels

- Fully enclosed underground locations
that are often long distances
- Indoor coverage includes:
The tunnel itself, and platforms, and outside
or above ground areas.

Shopping Centres

- **Complicated structural design:**
Few partition walls, multiple levels
- **Indoor coverage includes:**
Shopping areas, management offices, security offices, meeting rooms, rest rooms, underground parking, etc.

Hytera BDAs

Highlights

- **Rugged construction:**
Metal housing = good ingress protection and heat dissipation
- **Portable:** small, lightweight, with flexible mounting options
- **Comprehensive range of variants:**
integrated/distributed, band/channel select, direct/wireless coupling, VHF/UHF
- **Flexible network topologies:**
tree/star/chain/ring/hybrid – to allow best fit for application

DS-9300 Highlights

- **Multi-network type:** DMR, PDT, TETRA are supported
- **Easy to deploy:** DS-9300 is small, light-weight, with flexible mounting options
- **UHF:** DS-9300 supports 400–470MHz
- **Excellent out-of-band rejection:**
the DS-9300 starts signal rejection from 50KHz, which provides excellent rejection of out-of-band signals, which enhances coverage and voice quality
- **Excellent intermodulation attenuation:** for the DS-9300, 8 carriers deliver –45dBc Intermodulation attenuation which is effective in eliminating the interference of intermodulation signals. This helps to provide better coverage and voice quality

TS-9200 Highlights

- **Multi-network type:** DMR, PDT, TETRA are supported
- **Integrated and distributed:** TS-9200 offers both options
- **VHF:** TS-9200 supports VHF (136–174MHz) and UHF (Integrated model only) (350–520MHz)
- **Channel and band select variants:** TS-9200 supports both options
- **Analogue fibre:** some TS-9200 BDA's can be connected with analogue fibre

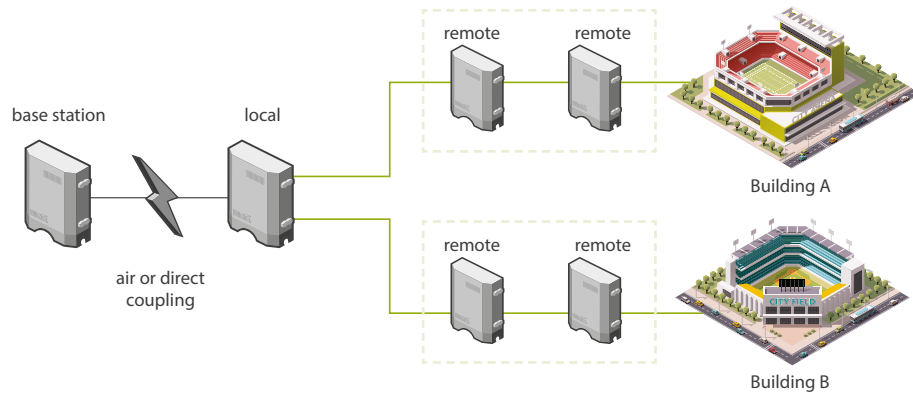
Flexible networking options

Distributed BDA's can offer a number of different network topology options to suit the best distribution of the signals dependent on the coverage requirement.

BDA Network – Tree Network

Dot Coverage

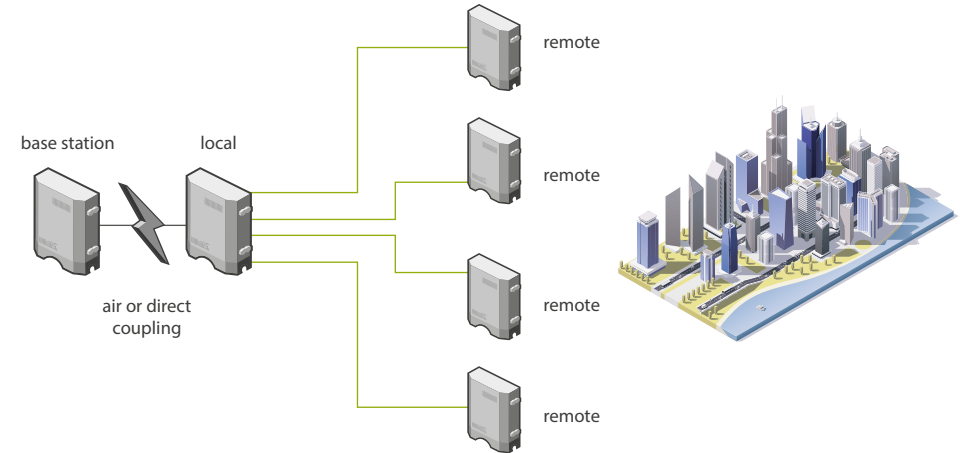
Coverage for big public stadium can be realised with one local optical-fiber BDA with some remote BDA's.



BDA Network – Star Network

Example use:

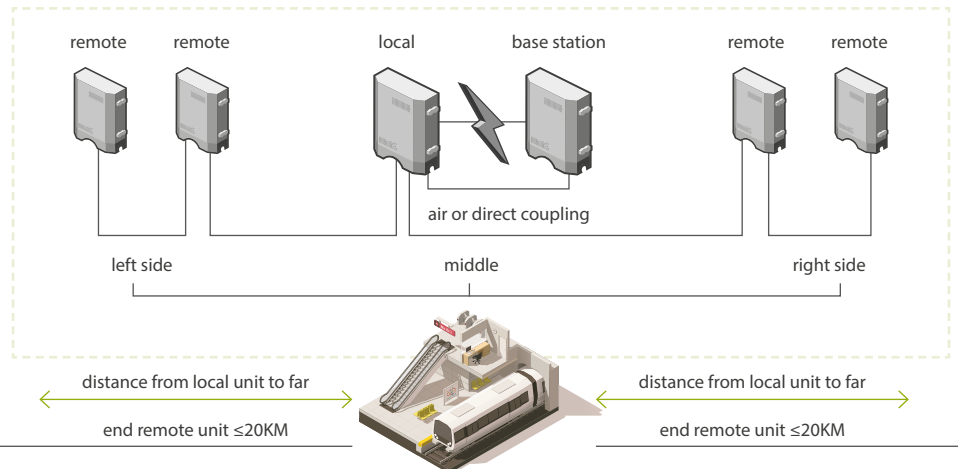
Office buildings, where multiple remote units can be distributed to provide coverage in blind spots.



BDA Network – Chain Network

Linear Coverage

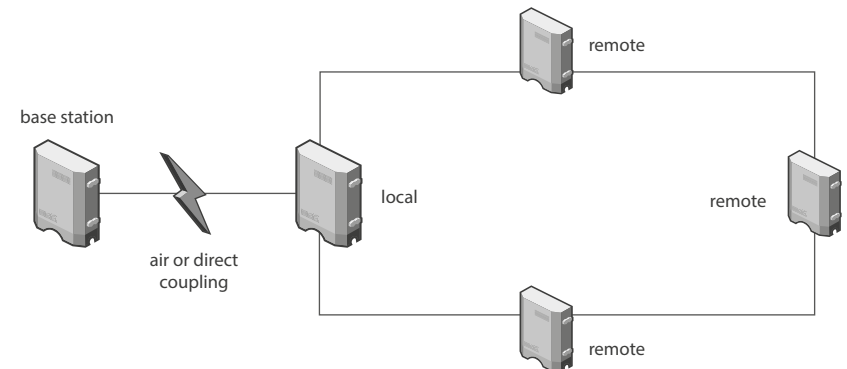
Tunnel, subway and other weak coverage area.



BDA Network – Ring Network

Optical link backup:

For customers that require full redundancy, ring networking provides full link backup.

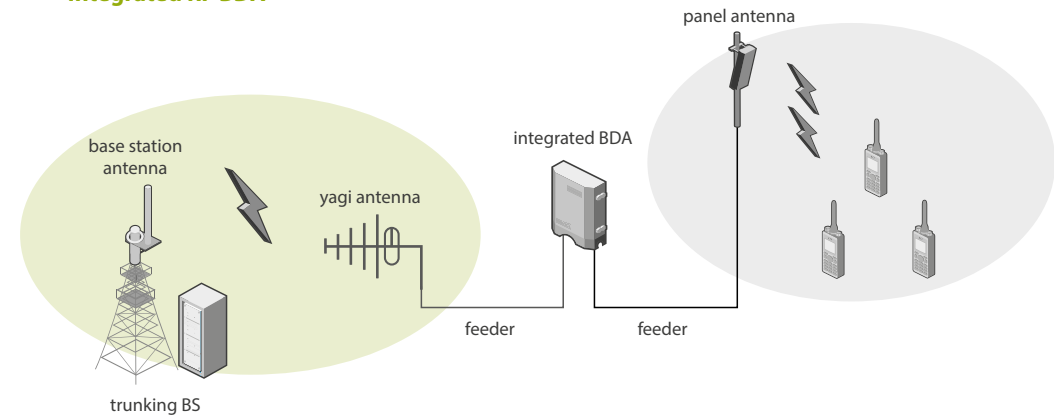


Classification

- BDA's are classified under a number of criteria:
 - Transmission mode – wireless (integrated) or fibre (distributed)
 - Band or channel selective
 - Wireless or direct coupling
- Hytera offer a range of BDA products to meet the above classifications
- Selection of the type depends on the requirements

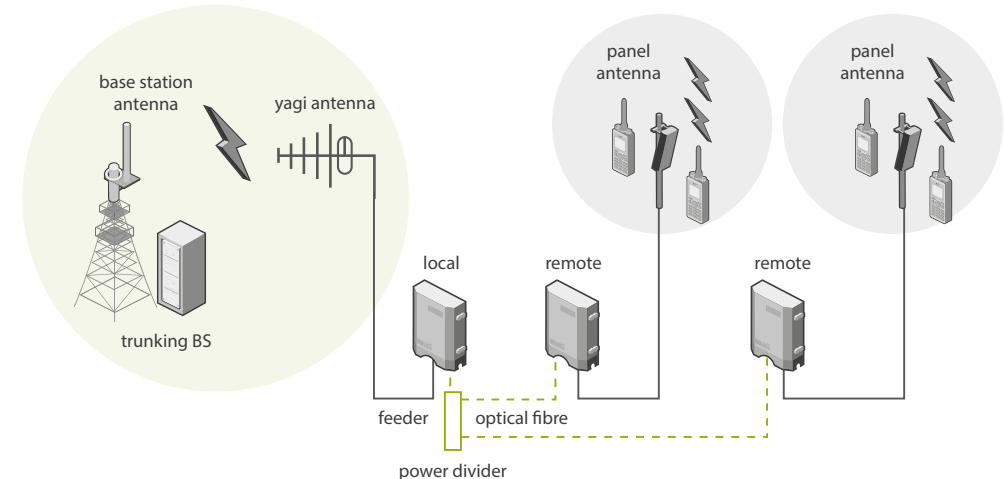
Classified by transmission mode	Integrated BDA	Obtain wireless signal from the signal source, and transfer it into feeder signal, then use the antenna to provide the coverage
	Distributed optical fibre BDA	Composed of local and remote unit, local unit obtains signal from signal source with feed cable, and converts electrical signal into photo-signal and transmits to remote unit, the remote unit converts the photoelectric signal back to electrical and the antenna provides the desired signal coverage
Classified by selection mode	Band-selective BDA	Select the specified frequency range to amplify
	Channel-selective BDA	Select specified frequency points to amplify

Integrated RF BDA



- System gain & power output are high enabling wide coverage
- Used to extend coverage or in shorter tunnels & high-storey buildings

Distributed BDA



- One local unit can connect several remote units
- Local & remote units connected via optical fibre
- Direct and wireless coupling options available
- High power/wide coverage
- Used in tunnels/large building complexes or areas far away from the BS

DS-9300 Range



5W 8/16 channel-selective (local unit)



5W 8/16 channel-selective (remote unit)



5W digital band-selective (local unit)



5W digital band-selective (remote unit)

DS-9300 Range

Cable Access Specifications				
Category	Name	Item	Specification	
			Downlink	Uplink
Cable-access band-selective	DS-9300 Digital optical fiber band-selective repeater	Frequency range – U1,U3	350–400 MHz, 400–470 MHz	
			Operating bandwidth: 5 MHz, TX and RX spacing: 10 MHz	
		Max. output power	37±2 dBm	-10±2 dBm
		Max. gain	50±3 dB	45±3 dB
		Dimensions	Donor unit: 442mm x 320mm x 44mm (cable-access)	
Remote unit: 385mm x 300mm x 142mm				
Cable-access channel-selective	DS-9300 Digital optical fiber channel-selective repeater	Frequency range – U1,U3	320–400MHz,400–470MHz	
			Operating bandwidth: 5 MHz, TX and RX spacing: 10 MHz	
		Channel bandwidth	25 KHz	25 KHz
		Number of channels	1 to 16	1 to 16
		Max. output power	37±2 dBm	-10±2 dBm
		Max. gain	50±3 dB	45±3 dB
		Dimensions	Donor unit: 442mm x 320mm x 44mm (L x W x H)	
Remote unit: 385mm x 300mm x 142mm				
Wireless Access Specifications				
Wireless-access band-selective	DS-9300 Digital optical fiber band-selective repeater	Frequency range – U1,U3	350–400 MHz, 400–470 MHz	
			Operating bandwidth: 5 MHz, TX and RX spacing: 10 MHz	
		Max. output power	37±2 dBm	30±2 dBm
		Max. gain	95±3 dB	90±3 dB
		Dimensions	Donor unit: 385mm x 300mm x 142mm (wireless-access)	
Remote unit: 385 mm x 300 mm x 142 mm				
Wireless-access channel-selective	DS-9300 Digital optical fiber channel-selective repeater	Frequency range – U1,U3	350–400MHz,400–470MHz	
			Operating bandwidth: 5 MHz, TX and RX spacing: 10 MHz	
		Channel bandwidth	25 KHz	25 KHz
		Number of channels	1 to 16	1 to 16
		Max. output power	37±2 dBm	30±2 dBm
		Max. gain	95±3 dB	90±3 dB
		Dimensions	Donor/remote unit: 385mm x 300mm x 142mm (wireless-access)	
Remote unit: 385 mm x 300 mm x 142 mm				

TS-9200 Range



5W/10W wireless access band/8 channel selective integrated repeater



5W wireless access fibre band-selective distributed repeater (local unit)*



5W wireless access fibre band-selective distributed repeater (remote unit)*



5W wireless access digital 8 channel-selective distributed repeater (local/remote, split type)*



5W 16 channel digital fibre channel-selective distributed repeater (remote unit, split type)*



5W 16 channel digital fibre channel-selective distributed repeater (local unit, split type)*

*VHF Only – for UHF –please refer to DS-9300 range

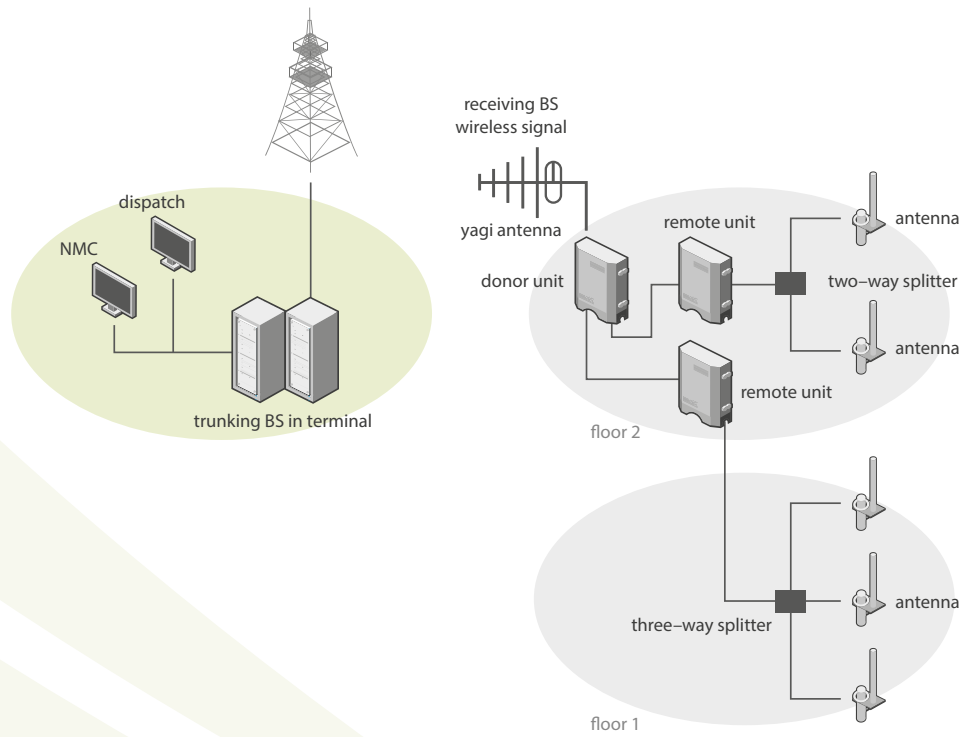
TS-9200				
Integrated Repeater Specifications				
Category	Name	Item	Specification	
			Downlink	Uplink
Wireless-access band-selective repeater	10W Wireless-access band-selective repeater	Frequency range	350–520 MHz (UHF)	
		Operating bandwidth	Operating bandwidth: 5 MHz, TX and RX spacing: 10 MHz	
		Max. output power	40±2 dBm	33±2 dBm
		Max. gain	90±3 dB	85±3 dB
		Dimensions	Cast aluminium case: 453mm x 357mm x 217mm (L x W x H) Sheet metal case: 530mm x 400mm x 200mm (L x W x H)	
	5W Wireless-access band-selective repeater	Frequency range – VHF	136–174 MHz	136–174 MHz
		Operating bandwidth	Operating bandwidth: 1–2 MHz, TX and RX spacing: 5.7–10 MHz	
		Max. output power	37±2 dBm	30±2 dBm
		Max. gain	90±3 dB	85±3 dB
		Dimensions	Cast aluminium case: 453mm x 357mm x 217mm (L x W x H) Sheet metal case: 530mm x 400mm x 200mm (L x W x H)	
Wireless-access digital 8-channel-selective repeater	10W Wireless-access digital 8-channel-selective repeater	Frequency range – UHF	350–520 MHz	
		Operating bandwidth	Operating bandwidth: 5 MHz, TX and RX spacing: 10 MHz	
		Channel spacing	25 kHz	25 kHz
		Number of channels	8	8
		Max. output power	40±2 dBm	33±2 dBm
	5W Wireless-access digital 8-channel-selective repeater	Max. gain	95±3 dB	90±3 dB
		Dimensions	Cast aluminium case: 453mm x 357mm x 217mm (L x W x H) Sheet metal case: 530mm x 400mm x 200mm (L x W x H)	
		Frequency range – VHF	136–174 MHz	136–174 MHz
		Operating bandwidth	Operating bandwidth: 1–2 MHz, TX and RX spacing: 5.7–10 MHz	
		Channel spacing	25 kHz	25 kHz
5W Wireless-access digital 8-channel-selective repeater	Number of channels	8	8	
	Max. output power	37±2 dBm	30±2 dBm	
	Max. gain	95±3 dB	90±3 dB	
	Dimensions	Cast aluminium case: 453mm x 357mm x 217mm (L x W x H) Sheet metal case: 530mm x 400mm x 200mm (L x W x H)		

TS-9200 – Distributed Repeater				
Wireless Access Specifications				
Category	Name	Item	Specification	
			Downlink	Uplink
Digital band-selective optical fiber repeater Wireless Access	5W Digital band-selective optical fibre repeater	Frequency range	136–174 MHz	
			Operating bandwidth: 1–2 MHz, TX and RX spacing: 5.7–10 MHz	
		Max. output power	37±2 dBm	30±2 dBm
		Max. gain	90±3 dB	85±3 dB
		Dimensions	Outdoor donor unit : 530mm x 400mm x 200mm (L x W x H)	
Remote unit: 530mm x 400mm x 200 mm (L x W x H)				
Digital channel-selective optical fiber repeater Wireless Access	5W Digital 8-channel-selective optical fiber repeater	Frequency range	136MHz–174MHz	
		Operating Bandwidth	Operating bandwidth: 1–2 MHz, TX and RX spacing: 5.7–10 MHz	
		Channel bandwidth	25 kHz	25 kHz
		Number of channels	8	8
		Max. output power	37±2 dBm	30±2 dBm
		Max. gain	95±3 dB	90±3 dB
		Dimensions	Donor/Remote unit: 530mm x 400mm x 200mm (L x W x H)	

TS-9200 – Distributed Repeater				
Cable Access Specifications				
Category	Name	Item	Specification	
			Downlink	Uplink
Digital band-selective optical fibre repeater. Cable Access	5W Digital band-selective optical fibre repeater	Frequency information	136–174 MHz	
			Operating bandwidth: 1–2 MHz, TX and RX spacing: 5.7–10 MHz	
		Max. output power	37±2 dBm	30±2 dBm
		Max. gain	90±3 dB	85±3 dB
		Dimensions	Outdoor donor unit : 530mm x 400mm x 200mm (L x W x H)	
Remote unit: 530mm x 400mm x 200 mm (L x W x H)				

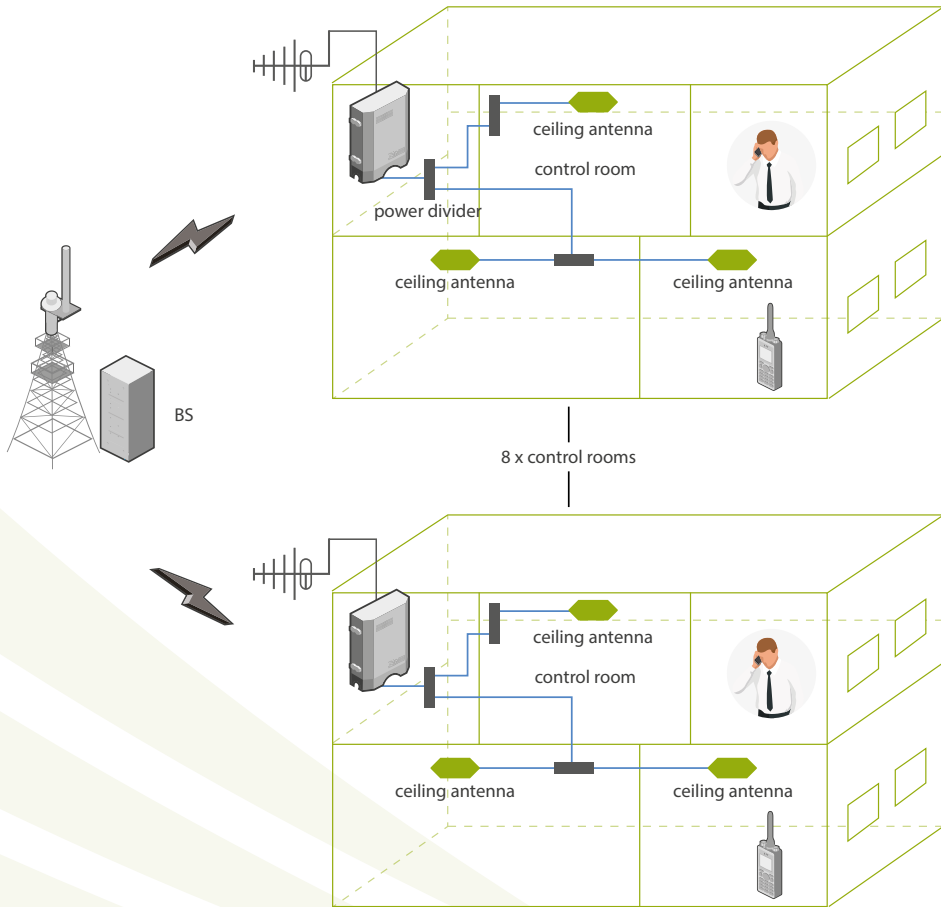
Example uses

Distributed BDAs to eliminate blind spots – example at an airport

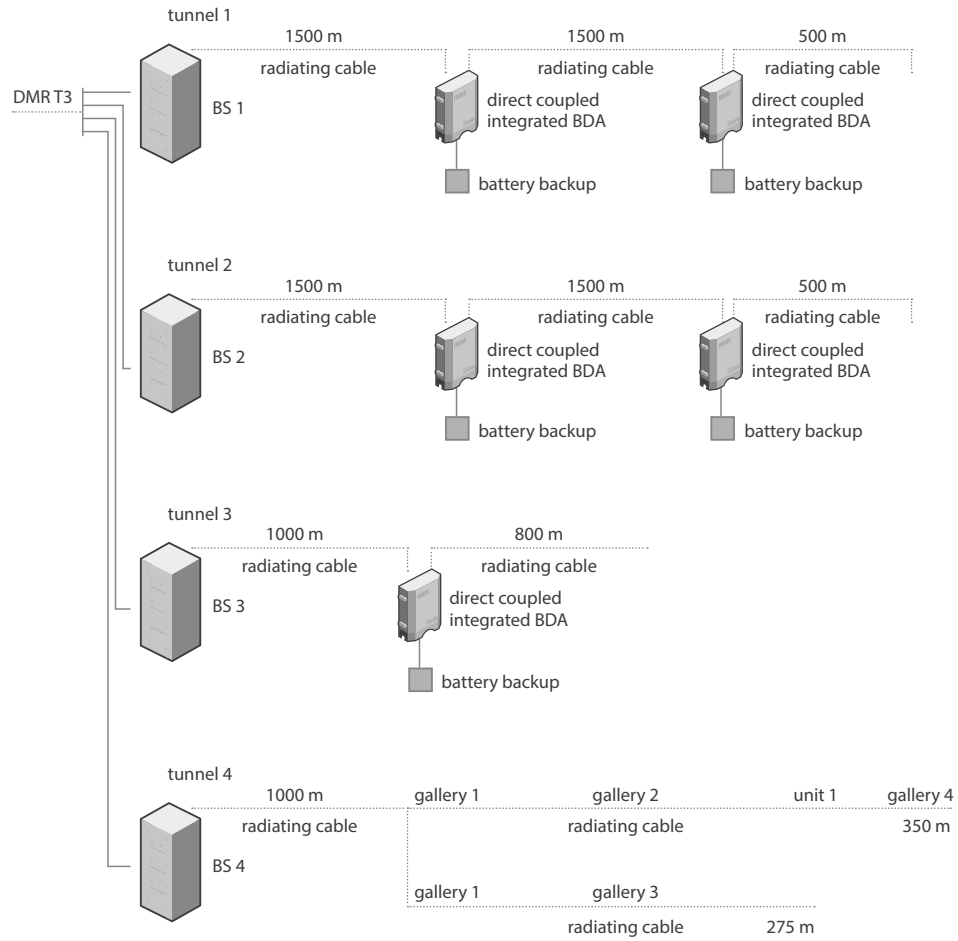


Example uses

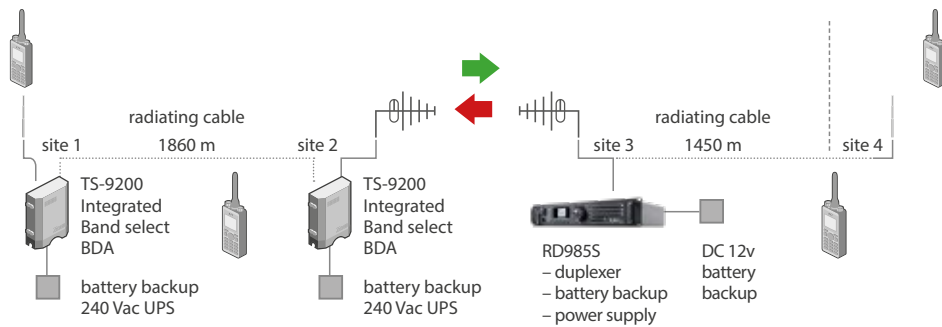
Extension of base station coverage into buildings



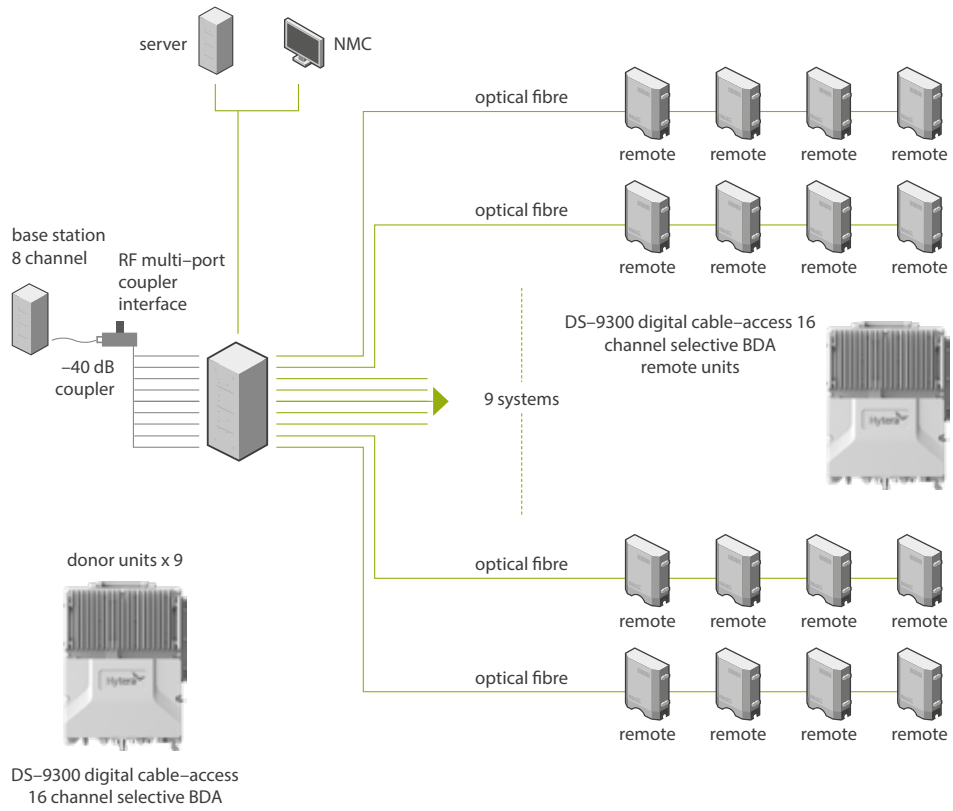
Tunnel coverage solution



Multiple tunnel coverage solution



**Distributed BDA – multiple remote connections/extended coverage range
– example: wind farm installation**





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