

# Bridges

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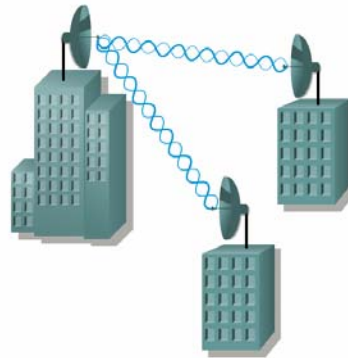
## Key terms

- **Root bridge**
- **Non-Root bridge with clients**
- **Non-Root bridge without clients**
- **Repeater AP**
- **Root AP**
- **Site-Survey client**
- **Installation mode**

## Bridging Defined

Cisco.com

**Bridges are used to connect two or more wired LAN's, usually located within separate buildings, to create one large LAN.**



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## Technology Comparisons

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Technology	Installation Cost	Monthly Cost (USD)	Barriers to Implement
Dialup or 56K	\$0 to \$250	\$25 to \$50	Remote locations
Cable/DSL	\$0 to \$250+	\$25 to \$150	Reliability
E1, T1	\$250 to \$1,000+	\$400 to \$1000+	Availability
Fiber	\$5,000 to \$200,000+	\$0	Physical obstructions
Microwave	\$15,000+	\$0	Licensing, Weather
802.11	\$2,000 to \$15,000	\$0	Interference

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## Emerging Markets — Bridging

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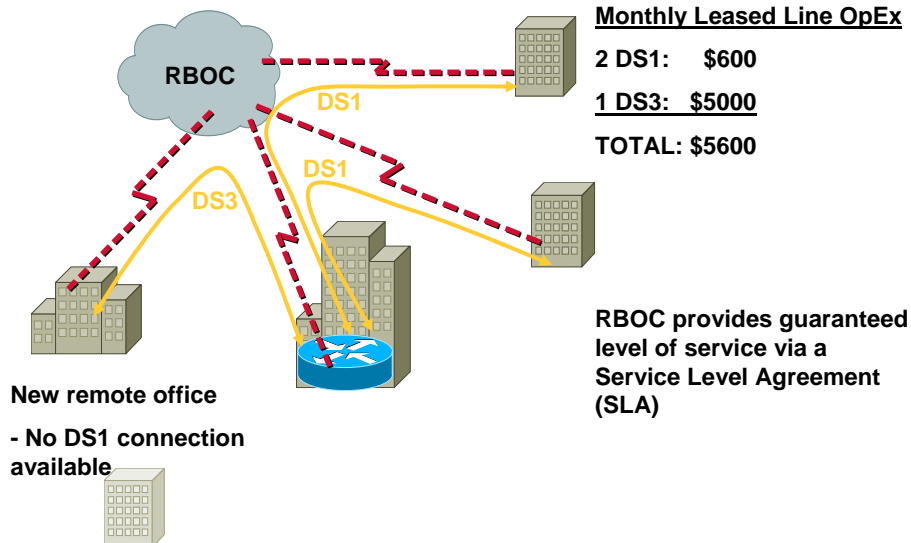
Wireless building-to-building bridges connect separate LANs at high speed  
No tariff, no recurring fee  
E1, T1 alternative  
High-speed internet access (ISP)  
Educational campuses  
International markets  
Developing countries  
Alternative to wired data infrastructure  
Rapid deployment with lower cost

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## Traditional WAN Connectivity

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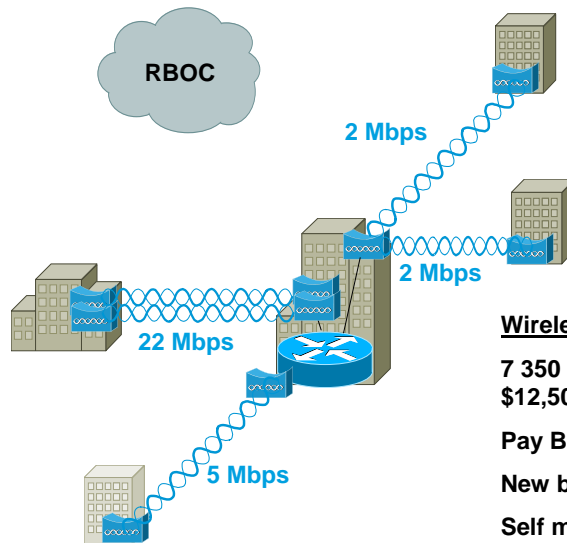


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## 802.11b Connectivity

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### Monthly Line Cost

2 DS1: \$600  
1 Fractional DS3: \$3000  
TOTAL: \$3600

### Wireless Installation Cost

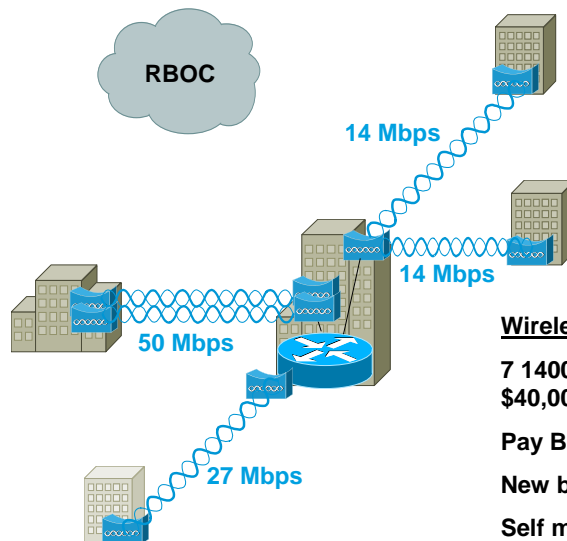
7 350 Series Bridges Installed:  
\$12,500 USD  
Pay Back Period: 3 months  
New building connected  
Self managed

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## 802.11a Connectivity

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### Monthly Line Cost

2 DS1: \$600  
1 DS3: \$5000  
TOTAL: \$5600

### Wireless Installation Cost

7 1400 Series Bridges Installed:  
\$40,000 USD  
Pay Back Period: 8 months  
New building connected  
Self managed

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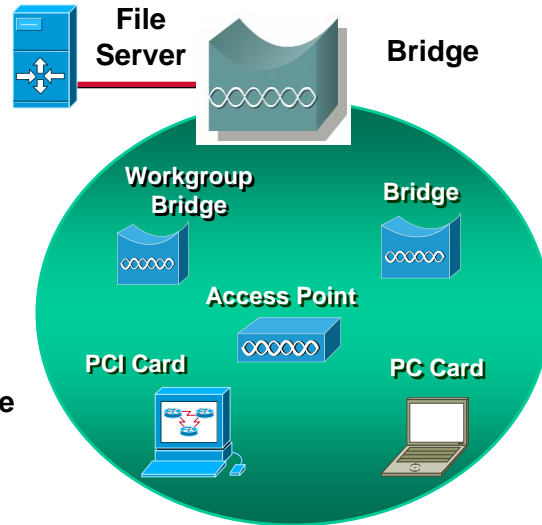
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## Role in Radio Network

Cisco.com

### Role in Radio Network

- Determines functionality within WLAN
- Determines which type of clients will be supported

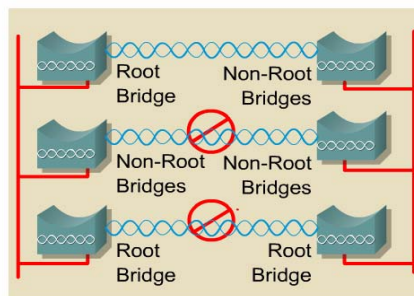


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## Parent – Child Relationship (Root Bridge vs. Non-Root Bridge)

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### Root Bridge (Parent):

- Accepts associations and communicates with Non-Root Bridge (child) devices
- Will not communicate with other Root Bridge devices
- Communicates with multiple Non-Root bridges

### Non Root (Child):

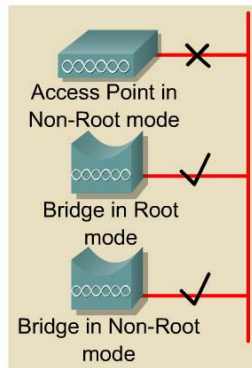
- Can associate and communicate with Root devices or Clients
- Will not communicate with other Non-Root devices
  - Unless other Non-Root device is communicating with a parent

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## Root Mode: Access Point vs. Bridge

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### Access Point in Non-Root mode

- Management traffic ONLY via Ethernet

### Bridge set to Root or Non-Root

- Able to send traffic via Ethernet or Radio

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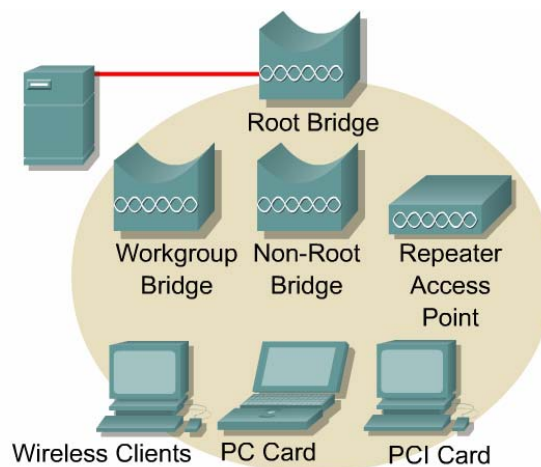
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## Root Bridge

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### Communicates with:

- Non-Root Bridge
- Workgroup Bridge
- Repeater Access Points
- Wireless Clients



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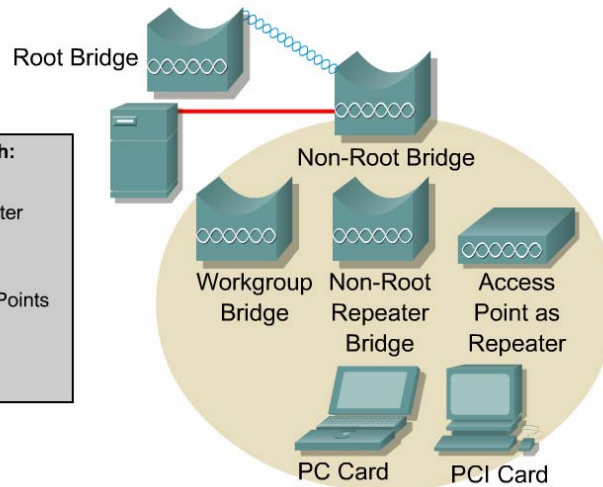
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## Non-Root Bridge with Clients

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**Communicates with:**

- Root Bridge
- Non-Root Repeater Bridges
- WGB
- Repeater Access Points
- Wireless Clients



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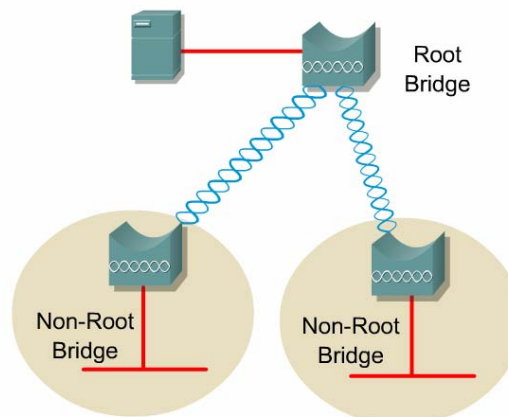
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## Non-Root Bridge without Clients

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**Communicates with:**

- Root Bridge only



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## Bridge Configured as a Root Access Point

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- Same functionality as Cisco Aironet Access Point
- Supports all wireless clients

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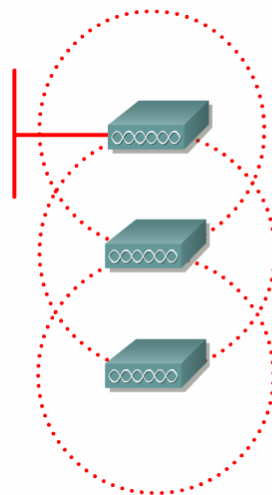
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## Bridge Configured as a Repeater Access Point

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### Connects to:

- Root Bridges
- Non-Root bridges
- Root access points
- Other repeater access points
- Repeaters are not covered by 802.11 standards



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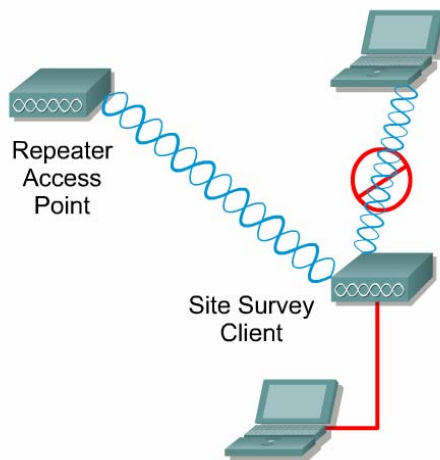
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## Bridge Configured as a Site Survey Client

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- Used to survey access point configured as repeater
- Will not accept associations from Wireless Clients

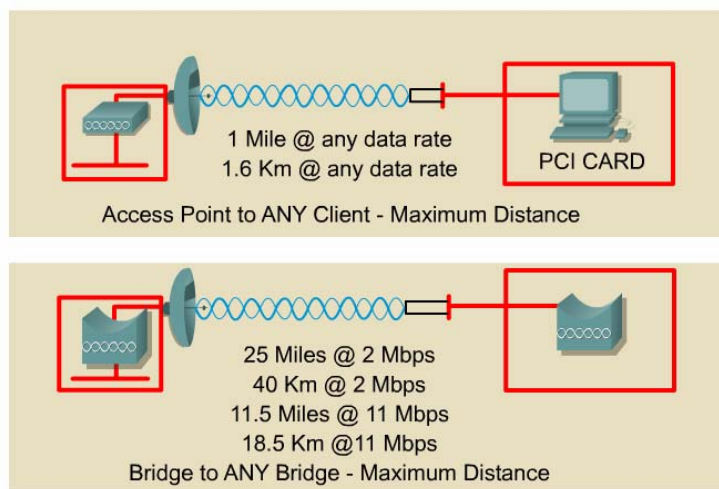


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## Distances Limited by 802.11 Specification

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## Optional 2.4GHz Antennas for Long Range

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- **13.5 dBi Yagi**  
Distances over  
7.3 miles @ 2 Mbps  
11.7 Km @ 2 Mbps  
3.6 miles @ 11 Mbps  
5.8 Km @ 11 Mbps



- **21 dBi Solid Dish**  
For distances up to  
25+ miles @ 2 Mbps  
40+ Km @ 2 Mbps  
20.5 miles @ 11 Mbps  
33 Km @ 11 Mbps

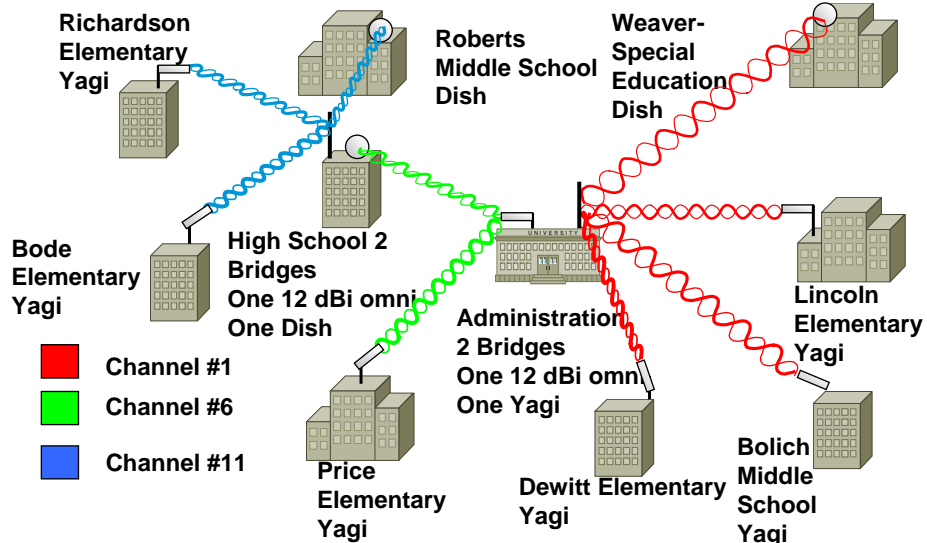
**Note:** Distances include 50 feet of low loss cable and 10 dB fade margin

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## 11b Bridge Application: School District

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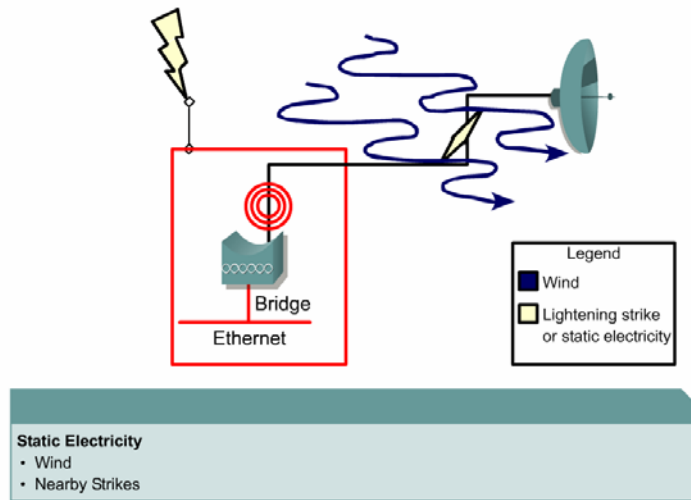


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# Lightning

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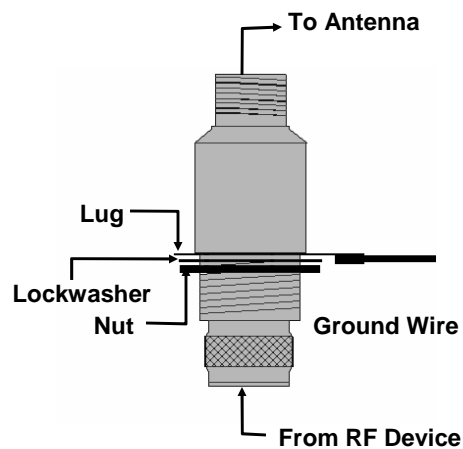
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# Lightning Arrestor

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**Designed to protect LAN devices from static electricity and lightning surges that travel on coax transmission lines**

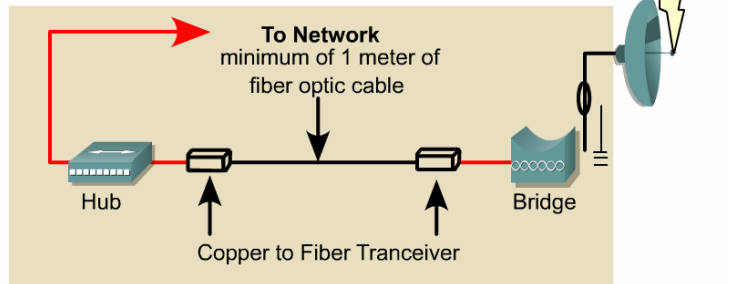
**RP-TNC connectors used on all Cisco Antennas**



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## Direct Strike Protection



### Protection from a direct strike

- 1 meter fiber optic cabling
- Electricity will not travel over fiber
- Transceivers require power

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## Coax Connection Sealing

Number one problems  
with bridges - water in  
the connectors

Proper sealing  
is important

Coax Seal is one  
product that is  
inexpensive and  
works great



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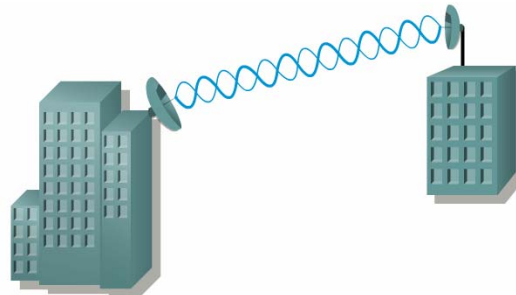
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## Path Loss Considerations

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The following are needed to determine coverage

- Antenna Gain
- Transmitter Power
- Receiver Performance
- Cable Losses
- Environmental Structures



22 miles/34.50 Km?

How far will it go?  
How fast will it go?  
How much will it cost?

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## Power Injector LR

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**Converts standard 10/100 baseT Ethernet RJ-45 interface to F-Type connector dual coaxial cable**

**Power provided over dual coaxial cable with power discovery to protect other appliances**

**Support for longer cable runs by resetting the 100 meter, 100baseT Ethernet timer, enabling total cable runs of 200 meters.**

**Surge protection provided at the F-Type connectors to protect infrastructure devices**



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## Optional 5GHz Antennas for Long Range

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9.5 dBi sector (H or V polarization)



9 dBi omni (Vertical polarization)



28 dBi dish (H or V polarization)

### Network configurations

- Point to point
- Point to multi-point

Roof, pole, and wall mounting options

### 5.8 GHz Unlicensed Band Operation

- Rapid deployment and re-commissioning

Operating temp range: -30 to +55 °C

Humidity: 0 to 100%

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