

FlexWave™ Prism

Flexible Outdoor Wireless Coverage and Capacity





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FlexWave™ – ADC's Next Generation of Wireless Solutions for Improving Wireless Capacity, Coverage, Flexibility and Customer Retention

ADC's FlexWave™ Prism is the most flexible, scalable and complete solution for addressing coverage and capacity needs for current and emerging wireless networks. The Prism improves wireless network coverage and capacity by extending services from existing cell sites, to hard-to-reach areas by distributing coverage from a centralized radio suite.

Utilizing a centralized distributed architecture, service providers are able to recognize significant CAPEX/OPEX savings through a shared Base Station Hotel (multiple BTS co-located together), as well as a shared Remote Radio Transceiver approach. The Prism's flexibility and scalability offers service providers an optimal solution for multiple applications such as; dense urban centers, dense suburban areas, campuses, enterprise buildings, subways and tunnels. The Prism's distributed architecture and small form factor allows service providers to cost-effectively increase coverage and capacity in these hard-to-reach areas.

Features and Benefits:

- Flexible Architecture
 - Supports multiple frequency bands and wireless protocols in one enclosure
 - Scalable and modular
 - Multiple non-contiguous segments of 1.5 to 75 MHz each
 - BTS interface supporting RF and OBSAI/CPRI standards (Future)
 - Transport rates supporting Dark Fiber and Millimeter Wave
 - Field upgradeable
- User Friendly
 - Embedded element management system, supporting web based access and SNMP
 - Fully sealed, maintenance free electronics for harsh outdoor applications
- Cost Effective
 - Efficient use of CAPEX equipment and real estate

Overview

With the increasing popularity and reliance on wireless voice and data services, subscribers expect to have coverage at anytime, anywhere. In addition to increased wireless device usage, wireless service providers implementing 3G technologies have recognized a reduction in coverage patterns within existing coverage footprints, opening coverage "holes" within the network. To resolve this issue, it requires service providers to extend coverage and/or increase capacity within the non-coverage areas. This has been traditionally accomplished by adding new macro cell towers; however, with city centers becoming more congested and local government zoning regulations becoming more stringent, obtaining permits for new macro cell sites is becoming increasingly difficult. The Prism offers service providers a flexible, small form factor solution to extend coverage and capacity where needed, as well as support for the increasing number of protocols and frequencies available today and in the future.

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Application

The FlexWave Prism uses patented digital-over-fiber technology to distribute RF to desired locations. The Prism digitizes the entire designated RF band and digitally transports it over dark fiber or millimeter wave links and reconstructs the signal at full bandwidth, regardless of modulation technology, at the remote location. ADC's digital RF transport allows RF signals to be replicated at full dynamic range, independent of the link length, for improved data throughput. As service providers migrate to 3G and 4G networks, high-data rate broadband services, networks utilizing a Prism backbone will be ready.

The Prism offers a flexible architecture to distribute wireless coverage and capacity. Its versatility and small form factor allow service providers to quickly deploy networks in areas where zoning restrictions often hinder installation of traditional macro cell towers and base stations.

Centralization of base station capacity can also be realized using the FlexWave Prism. This allows service providers to further benefit by reducing capital expenditures and annual operating costs.

System Description

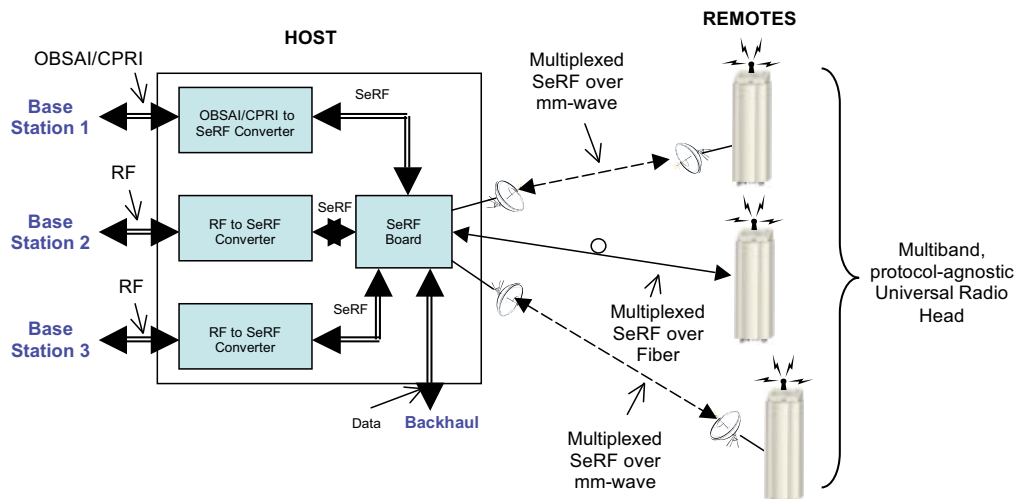
The FlexWave Prism is a flexible and cost effective solution for Distributed Antenna System applications: Microcell and/or CPRI/OBSAI Remote Radio Head applications:

- Next Generation DAS; optimized for multiple frequency bands, scalable RF bandwidth & transport rates
- Flexible SeRF technology; serial RF processing, enabling scalable frequency bands and bandwidths
- Digital RF Transport; Digitally transports RF from the BTS to remote locations for distribution of RF signals.
- Digital simulcast; signal is digitally combined and split to multiple remotes

Future enhancements will include:

- CPRI/OBSAI; flexibility to support BTS interface standards
- Microcell; fully contained capacity solution utilizing cost efficient low bit-rate IP backhaul
- IP ready platform; smooth integration to IP front/backhaul networks

**Sample System Configuration
(3 Band 3 Remote Simulcast)**



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Host Unit

Host Unit

The rack-mountable FlexWave Prism Host Unit is typically located at a Base Station or a facility housing a suite of Base Stations. On the forward path, the Host Unit receives the RF signals from the BTS and digitizes the designated RF bands and digitally transports them over single mode fiber or a millimeter wave link to the Remote Units. On the reverse path, the Host Unit receives the digitized RF signals from the Remote Unit and converts them back to RF for the BTS.

The Prism Host Unit is completely modular in design. Digital/Analog Radio Transceiver (DARTS) are hot swappable providing easy upgrades to additional bands without interrupting existing service.

The Prism Host Unit supports up to eight DART cards (supporting up to eight Remote Units) and is capable of simulcasting signals up to as many as eight Remote Units.

The Host Unit utilizes an embedded element management system for system configuration and network monitoring. The embedded EMS collects alarm information from both the Host and Remote Units. For multiple link deployments, multiple Host Units can be networked together at the same BTS site.

In addition to sending alarm notifications to the Element Management System (EMS) through software, the Prism Host Unit also features front panel alarm reporting. LEDs on the front panel of the Host Unit will change color depending on the status of the unit. LED displays provide information regarding the following items:

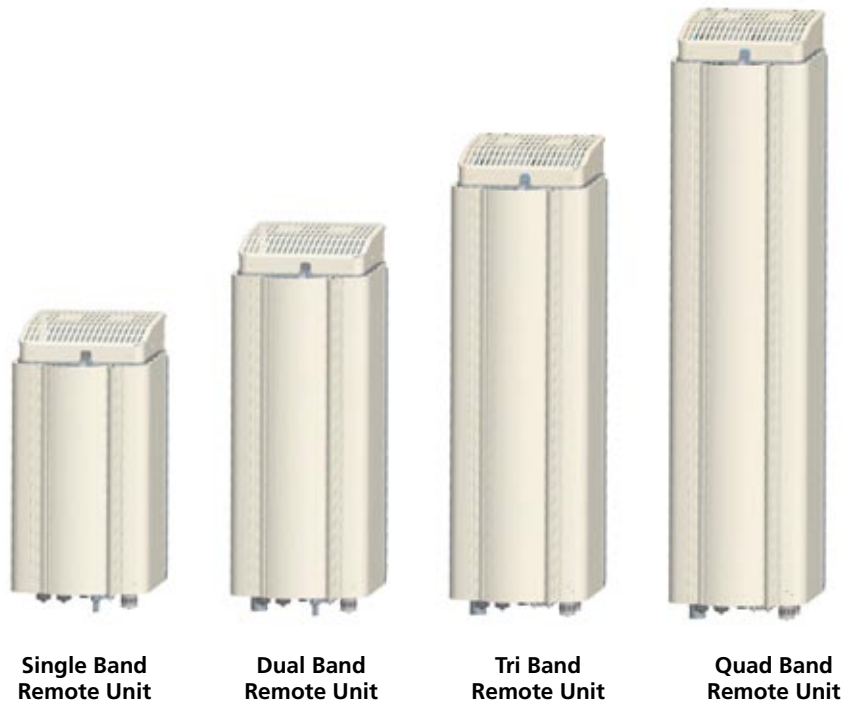
- Power
- System mode (active/standby)
- Indicate unit fault condition
- RF conditions



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Remote Units

The Prism Remote Units utilize a modular design, which supports up to four bands. Each Remote allows for future upgrades and easy field access.

Typical mounting options for the Remote Unit include: pole-mount, inside pole-mount, wall-mount, and sub-terrain vault-mount.

The electronics enclosure of the Prism Remote Unit is fully sealed IP-65 rated, which minimizes maintenance and is ideal for harsh environments. Fiber, antenna, and power input/output connectors are all sealed for maximum protection.

On the forward path, the Remote Unit receives the digitized spectrum from the Host Unit and converts the spectrum back into RF to be distributed via an externally mounted antenna system. On the reverse path, the Remote Unit digitizes the designated RF spectrum and digitally transports it over single-mode fiber or MMW to the Host Unit.

In addition to sending alarm notifications to the EMS software, the Prism Remote Unit also features LED alarm reporting. An LED on the bottom of the Remote Unit will illuminate upon a fault condition.



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Alarm and Management System

The FlexWave Prism utilizes an embedded network management for system configuration and network monitoring. The Element Management System (EMS) utilizes a web based interface or SNMP protocol for easy accesses to the system.

The EMS provides operational and maintenance capabilities for the Prism system (Host and Remote). The EMS can be used to set up and monitor status of any Host and any associated Remote Units. The EMS has the ability to configure the system, view status and parameter settings, download software, change parameters and monitor system performance and alarms

Access and troubleshooting can also be accomplished on-site at either the Host Unit and/or the Remote Unit by utilizing a craft interface. Thus, allowing technicians the ability to plug-in a laptop and access all associated units connected to it.

Host Site Capabilities

The EMS performs the following functions at the Host site:

- Provides real-time information regarding faults
- Set up simulcast ratios
- Digital timing delays
- Displays various system level values (voltages, RF, power, etc.)
- Records and generates history reports with time and date stamps
- Adjusts performance related parameters of the Host Unit and Remote Unit
- Permits placement of Host Unit and Remote Unit into standby mode
- Allows download of new software versions to the Host Unit and Remote Units



Network Monitoring Capabilities

The embedded EMS allows for remote alarm monitoring and network control of the Prism can also be performed from an off-site location or Network Operation Center (NOC). Communications to the NOC can be performed using the web based interface or SNMP protocol.

The EMS performs the following functions at off-site locations such as the NOC:

- Provides real-time information regarding faults
- Displays various system level values (voltages, RF, power, etc.)
- Adjusts performance-related parameters of the Host Unit and Remote Unit
- Permits placement of Host Unit and Remote Unit into standby mode
- Access records and generates history reports with time and date stamps
- Allows download of new software versions to the Host Unit and Remote Units



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Specifications

RF SPECIFICATIONS

Supported Frequency Blocks: 1-4 per Remote Unit; 1-8 per Host Unit
Bandwidth: 1.5 to 75 MHz non-contiguous
Frequency Band Supported: Cell (850), ESMR, PCS (1900), AWS (2100), E-GSM, DCS (1800), UMTS (2100)
Digital Simulcast: Up to 8:1 Single Host (can daisy chain Host for higher simulcast)
Diversity Receive: Yes (Optional)

PROPAGATION DELAY

System Delay: <5 dB typical, 6 dB max
Delay Management: Digital (Manual or Automatic)

NOISE FIGURE

Noise Figure: <5 dB typical, 6 dB max
Input IP3: >-8 dBm

OPTICAL SPECIFICATIONS

Optical Budget: 26 dB
Digital Transport Rate: 3.072 Gbps

OUTPUT POWER AT ANTENNA PORT (dBm)

Frequency Channels	Number of RF Carriers									
	1		2		4		8		16	
	Composite	Power per Carrier	Composite	Power per Carrier	Composite	Power per Carrier	Composite	Power per Carrier	Composite	Power per Carrier
CELL (850)	43.0	43.0	43.0	40.0	43.0	37.0	43.0	34.0	43.0	31.0
ESMR	38.1	38.1	38.1	35.1	32.1	32.1	38.1	29.1	38.1	26.1
PCS (1900)	43.0	43.0	43.0	40.0	43.0	37.0	43.0	34.0	43.0	31.0
AWS (2100)	43.0	43.0	43.0	40.0	43.0	37.0	43.0	34.0	-	-
E-GSM	31.0	31.0	34.0	31.0	37.0	31.0	40.0	31.0	40.0	28.0
DCS (1800)	32.8	32.8	35.8	32.8	38.1	32.8	41.8	32.8	41.8	29.8
UMTS (2100)	42.5	42.5	42.5	39.5	42.5	36.5	42.5	33.5	-	-

REMOTE UNIT ENVIRONMENTAL SPECIFICATIONS

Outside Ambient
Temp Rating: -40°C to +50°C (-40°F to +122°F)
Storage Temperature: -40°C to +70°C (-40°F to +158)
Humidity: 10% to 90% non-condensing
Lightning Protection: 20kA IEC 1000-45 8/30 µs Waveform

REMOTE UNIT

Enclosure: IP-65
Mounting: Wall, Pole, Inside Pole, Strand, and Vault
Single Band
Dimensions (H x W x D): 23.1" x 12.15" x 10.125" (58.67 cm x 30.86 cm x 25.71 cm)
Volume: 1.56 ft³
Weight: 47 lbs. chasis, 64 lbs. total (21 kg chasis, 29 kg total)
Dual Band:
Dimensions (H x W x D): 31.1" x 12.15" x 10.125" (78.99 cm x 30.86 cm x 25.71 cm)
Volume: 2.10 ft³
Weight: 63 lbs. chasis, 96 lbs. total (28 kg chasis, 43 kg total)
Tri Band:
Dimensions (H x W x D): 39.1" x 12.15" x 10.125" (99.31 cm x 30.86 cm x 25.71 cm)
Volume: 2.64 ft³
Weight: 79 lbs. chasis, 127 lbs. total (36 kg chasis, 57 kg total)
Quad Band:
Dimensions (H x W x D): 50.2" x 12.15" x 10.125" (127.51 cm x 30.86 cm x 25.71 cm)
Volume: 3.40 ft³
Weight: 98 lbs. chasis, 163 lbs. total (44 kg chasis, 74 kg total)
Cooling: Fan, IP-55
Optical Connectors: Sealed Proax

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Specifications (con't)

HOST UNIT

Mounting:	19-inch rack
Dimensions (H x W x D):	5.25" x 19" x 19" (13.34cm x 48.26 cm x 48.26) (3 RUs)
Weight:	<25 Pounds (<11 kg)

REMOTE UNIT POWER REQUIREMENTS

Power Supply:	100-240 VAC, 50-60 Hz
Battery Backup:	Yes (optional external UPS)

HOST UNIT POWER REQUIREMENTS

Power Source:	21 to 60 VDC
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ELEMENT MANAGEMENT

Embedded EMS:	Yes
SNMP Based Management:	Yes

Note: Unless noted otherwise specifications are typical and subject to change

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