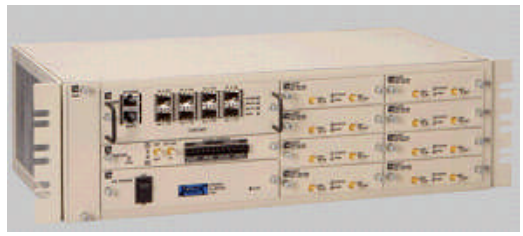
FlexWave™ Universal Radio Head

Universal Radio Head for Flexible Outdoor Coverage and Capacity

URH – Remote Unit



URH – Host Unit

SPEC SHEET

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

ADC's FlexWave™ Universal Radio Head (URH) is the most flexible, scalable and complete solution for addressing coverage and capacity needs for current and emerging wireless networks. The URH 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 savings through a shared Base Station Hotel (multiple BTS co-located together), as well as a shared Remote Radio Transceiver approach. The URH's flexibility and scalability offers service providers an optimal solution for multiple applications such as; a dense urban center, dense suburban area, campus, enterprise buildings, subways and tunnels. The URH'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 35 MHz
  - BTS interface supporting RF and OBSAI/CPRI (future) standards
  - Transport rates supporting Dark Fiber and Millimeter Wave
  - Field upgradeable
- User Friendly
  - Embedded element management system, supports web based access and SNMP
  - Fully sealed, maintenance free, for harsh outdoor applications
- Cost Effective
  - Efficient use of CAPEX equipment and real estate

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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 URH 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.

Application

The URH uses patented digital-over-fiber technology to distribute RF to desired locations. The URH digitizes the entire designated RF band and digitally transports RF over dark fiber or millimeter wave (MMW) 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 G4 networks, high data rate broadband services, networks utilizing a URH backbone will be ready.

The URH offers a flexible architecture to distribute wireless coverage and capacity. Its versatility and small form factor allows 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 URH. This allows service providers to further benefit by reducing capital expenditures and annual operating costs.

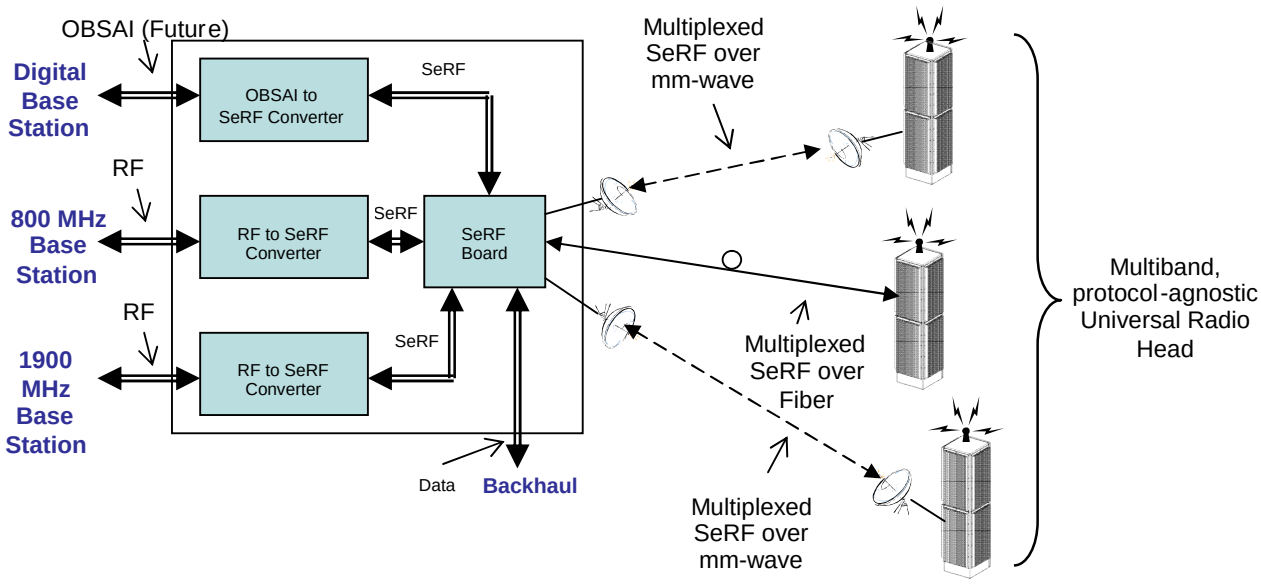
System Description

The URH 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 transport RF from the BTS to remote locations for distribution of RF signals

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



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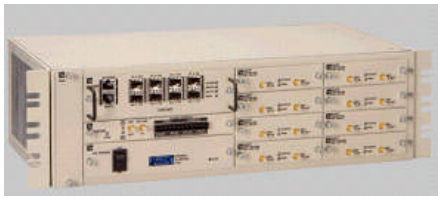


Host Unit

The rack-mountable 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 signal from the BTS and digitizes the designated RF band and digitally transports it over singlemode fiber or a millimeter wave link to a Remote Unit. In the reverse path, the Host Unit receives the digitized RF signal from the Remote Unit and converts it back to RF for the BTS.

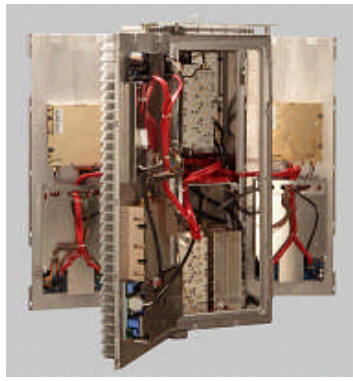
The URH Host Unit is completely modular in design, with all major modules; SeRF (Serial RF) card, DART (Digital/Analog Radio Transceiver) card, Power Supply, System board and Fan being hot swappable.

The URH 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. Host Units can be daisy-chained together to allow monitoring and control of multiple Remote Units from a single user interface.

In addition to sending alarm notifications to the Element Management System (EMS) through software, the URH 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 faulty unit
- RF conditions



Remote Unit

The URH Remote Unit utilizes a modular design, which supports up to three bands. Each side panel/door represents a single band allowing for future upgrades and easy field access. Mounting options for the Remote Unit include: pole-mount, inside pole-mount, wall-mount, strand-mount (singe-band unit only), and sub-terrain vault-mount.

The URH Remote Unit is a fully sealed IP-65 rated enclosure, 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 singlemode fiber or MMW to the Host Unit.

In addition to sending alarm notifications to the EMS software, the URH 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 URH 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 Element Management System (EMS) provides operational and maintenance capabilities for the URH system (Host and Remote). The EMS can be used to access and monitor status of any Host and any associated Remote Units. The EMS has the ability to 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:

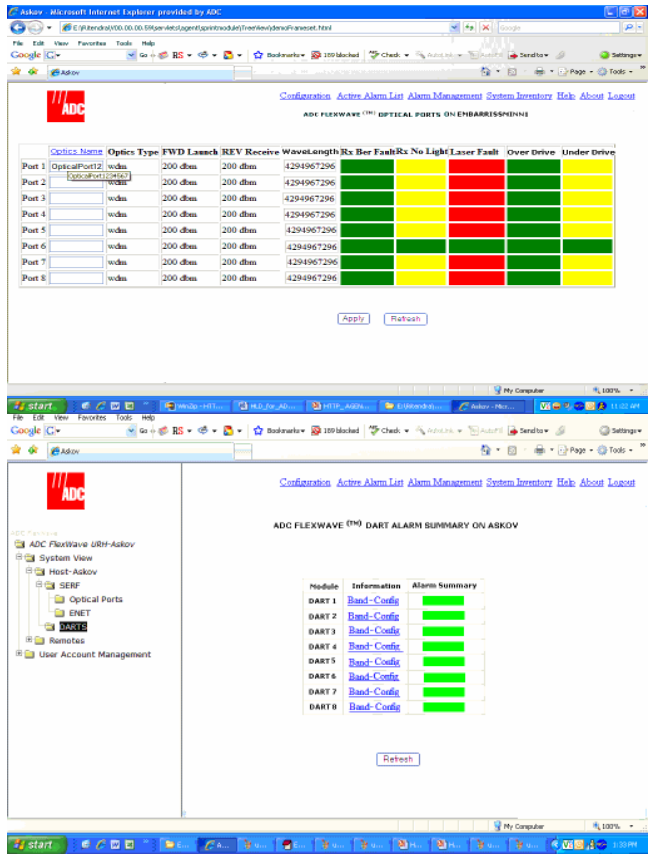
- Provides real-time information regarding faults
- Set up simulcast ratios
- Digital timing delays
- Displays various system level values (voltages, RF, power, etc.)
- Records and generates history reports with time and date stamps
- Adjusts performance related parameters of the Host Unit and Remote 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 URH 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 Specification	
Supported Frequency Blocks	1-3 per Remote Unit; 1-8 per Host Unit
Bandwidth	1.5 to 35 MHz non-contiguous
Frequency Band Supported	800 Cellular, E-SMR 800/900, 1900 PCS, 1800/2100 AWS (First Release) 700, 1800 & 2500 MHz (Future Releases)
Digital Simulcast	Up to 8:1 Single Host (can daisy chain Host for higher simulcast)
Diversity Receive	Yes (Optional)
Propagation Delay	
System Delay	<12 microseconds
Delay Management	Digital (Manual or Automatic)
Noise Figure	
Noise Figure	<5 dB
Input IP3	>-8 dBm
Optical Specifications	
Optical Budget	10 dB (Standard); 26 dB (Optional)
Digital Transport Rate	3.072 Gbps
Output Power	
Output Power per Band	38 dBm (6.5 Watts) Cell/SMR - October '07 43 dBm (20 Watts) PCS – November '07 43 dBm (20 Watts) AWS – December '07 43 dBm (20 Watts) Cell & SMR – Q2 '08 39 dBm (8 Watts) WiMAX – Q2 '08
General Specifications	
Remote Unit Outside Ambient Temp Rating	-40°C to +50°C
Storage Temperature	-40°C to +70°C
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
Dimensions	16.45" x 15.6" x 29.38"
Weight	≤200 Pounds (No component greater than 80 pounds)
Volume	3.66 cubic feet
Cooling	Passive Convection
Optical Connectors	Sealed PROAX
Host Unit	
Mounting	19- and 23-inch rack
Rack Units	3 Rack Units
Weight	<25 Pounds
Host Unit Power Requirements	
Power Source	21-60 VDC
Remote Unit Power Requirements	
Power Supply	100-240 VAC, 50-60 Hz
Battery Backup	Yes
Element Management	
Embedded EMS	Yes
SNMP Based Management	Yes

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

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