AVARI WIRELESS

ENABLING EMERGENCY COMMUNICATIONS INDOORS

Avari® VL™ Series

PUBLIC SAFETY MODULAR DIGITAL DAS

The Avari® VL™ is a digital transport-based Emergency Responder Communications Enhancement System (ERCES). This advanced Digital Distributed Antenna System (DAS) provides a reliable, high-performance, and high availability system designed to support both current and future public safety communication requirements.

Avari® VL™ has a flexible modular architecture – headend units that can accept base station or off-air feeds, an optional digital aggregation or distribution unit, and medium-high power remote units. The system supports DMR, TETRA, P25 Phase I and II, GSM-R, LTE, and FirstNet via software configurable upgrades and pluggable RF modules.

CANADA HQ
8618 COMMERCE COURT
BURNABY BC, V5A 4N6
CANADA

UNITED STATES HQ
1400 112TH AVE SE, STE 100
BELLEVUE, WA 98004
USA

UNITED KINGDOM HQ
40 CAVERSHAM ROAD
READING, BERKSHIRE RG1 7EB
UK

CONTACT
+1 (833) 502-2144
INFO@AVARIWIRELESS.COM
WWW.AVARIWIRELESS.COM

Reliable In-Building Communications

Public safety communications are a vital part of emergency services operations, from dispatch to mission-critical situations, and from voice-only capabilities to voice and data.

Over the years, public safety communications have evolved from simple fire call boxes to analog land mobile radios (LMR), to digital LMRs and trunked radio systems. Today the evolution continues with a shift to multi-mode communications combining LTE, data communications such as email, apps and VoIP, and IoT, enabling new technical appliances such as sensors, infrared, location mapping and drones. These new technologies can provide significant value for first responders yet without the right communications network in place, they are simply not available.

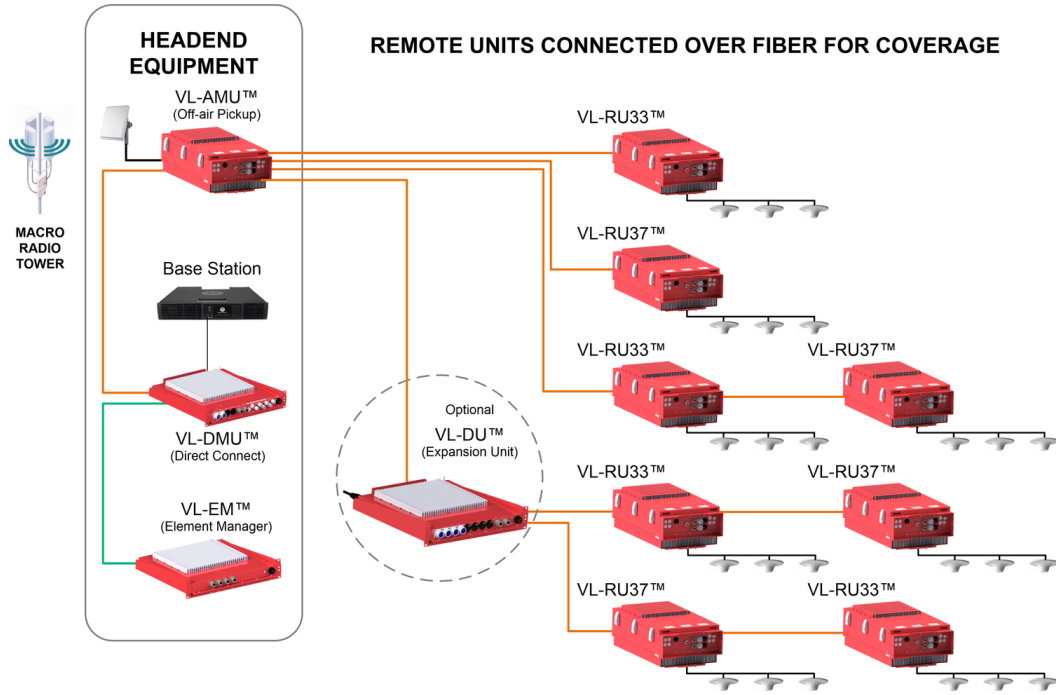
The Avari® VL™ Series is an advanced digital Distributed Antenna System (DAS) that provides secure, high-quality signal transport over a high availability system designed specifically to support both current and future public safety requirements.

Avari® VL™ Series

Avari® VL™ Series is an advanced digital transport-based Emergency Responder Communications Enhancement System (ERCES) that performs exceptionally well in medium to large-scale deployments both indoors and out. The system is software-configurable and supports both FirstNet and LTE waveforms ensuring a smooth transition from P25 Phase I and II to LTE.

The system has a simple and flexible modular architecture consisting of headend units that can accept base station or off-air feeds, an optional digital aggregation/distribution unit, medium and high power remote radio units (RRUs), and a master control unit that centralizes, integrates, and streamlines management and control for large system deployments and multiple system deployments. A 1Gbps Ethernet backhaul on each fiber connection supports appliances such as IP cameras, digital announcement systems and Wi-Fi access points.

The Avari® VL™ Series works with any base station direct RF feed, over-the-air, or repeater, to create a complete end-to-end high-performing public safety communications coverage system.



Self Healing Futureproof Technology

Advanced Digital Signal Processing

The Avari VL™ Series uses advanced digital signal processing to transform analog RF into high-quality digital signals. This minimizes noise interference and signal degradation during transport contributing to lower noise floor rise at the radio frequency (RF) source and ultimately providing higher quality and more reliable radio communications. New RF sources can now be added without introducing passive intermodulation (PIM).

Lossless Digital Transport

Avari's lossless digital transport ensures that signals retain their quality even over distances of up to 27dBo optical link budget. This enables new deployment scenarios such as centralized headend architectures, and indoor and underground applications, such as tunnels, subway systems and mines, without requiring additional boosters and/or headend units.

Automatic Optical Delay Compensation

Optical delay compensation, which mitigates time-delay interference, is important for narrowband waveforms and even more so for broadband waveforms like LTE which have stringent delay imbalance requirements.

The traditional process requires connecting the same length of fiber to all remotes, no matter the actual physical distance, or manually calculating and adding delay elements. Avari avoids this effort and expense by using automatic optical delay compensation to automatically measure, calculate, and digitally normalize optical delay across all fibers effectively synchronizing transmission from multiple simulcast antennas and resulting in improved overall system performance.

Software Reconfigurable and Upgradable

The Avari VL™ Series supports both current and future public safety communications requirements and streamlines the transition. Network owners can install an Avari VL™ network today, then expand and upgrade in the future without having to 'rip-and-replace'.

- Field Programmable Gate Array (FPGA) chipsets execute the advanced digital signal processing. These devices can be reprogrammed or upgraded by simply uploading a new image file to accommodate new waveforms or implement new standards.
- RF modules are pluggable and the system is reconfigurable. New RF band modules can be easily added later when required.
- Network configuration is done locally or remotely via the system's built-in Element Management System (VL-EM™).

Data Scrambling and Encryption

Avari VL™ Series scrambles all of the data transmitted over the fiber link to protect the content against eavesdropping, tampering and forging should it be intercepted during transport. The system itself is also secured by password protected and encrypted access to the control and management module using HTTP secure protocol (HTTPS), or HTTP over secure socket layer (SSL), or with transport layer security (TSL) that provides authentication and bi-directional encryption of communications across the Avari VL™ network.

Modular Architecture

Avari's modular architecture enables networks to be expanded and upgraded over time as requirements shift, and new technologies and frequencies come online. It also enables system designers to build effective system redundancy configurations into the overall system architecture.

Flexible Fiber Topology

Avari's approach to fiber topology is key to helping Avari's VL™ deployments achieve a low total cost of ownership. Its all-digital architecture enables multiple network topologies including star, chain and hybrid configurations. These cater to different deployment scenarios, help to reduce fiber plant usage and installation costs, and also facilitate effective redundancy configurations. With the ability to cascade host units, Avari VL™ can support centralized headend architectures and can easily enable new RF sources from different locations to be incrementally added to the existing distribution network without introducing passive intermodulation (PIM).

Redundancy

Avari achieves 1:1 redundancy by deploying a secondary host in parallel operating mode. The same can be accomplished at the remote site by deploying a secondary remote unit with an optical and RF bypass kit. Fiber diversity is achieved by deploying a secondary fiber that runs on a different path from the host to the remote unit. Additional redundancy can be achieved by deploying redundant RF modules inside the hosts.

Deployment Flexibility

Avari's powerful technology, together with its modular designs enables a wide range of deployment scenarios. Experts in medium to large complex deployments, Avari provides solutions across all industries, notably campuses, airports, tunnels, and utilities for example. Advanced digital signal processing, lossless digital transport, modular architecture and flexible fiber topologies allow for flexibility when it comes to deployments. Avari digital DAS system solutions can comfortably handle large geographies, centralized headend architectures, underground deployments, staged deployments, and redundancy architectures.

Reliability

- Convection cooled for high Mean Time Between Failure (MTBF)
- Compatible with battery backup systems
- Optional redundant internal RF modules
- Headend redundancy, fiber diversity and automatic failover

High Performance

- Single fiber digital transport
- High RF bandwidth capacity over fiber
- 1Gbps IP backhaul
- Advanced digital signal processing ensures high quality signals
- Lossless digital transport retains signal quality over distance

Ease of Use

- Automatic optical delay compensation
- local or remote software-based monitoring and control
- Pluggable RF modules allow new bands to be added later
- One solution covers both indoor and outdoor

Cost-Efficient

- Integrated off-air and headend to reduce costs and simplify installation
- High signal quality - even over existing fiber
- Flexible fiber topologies reduce fiber requirements
- Modular architecture enables phased deployments
- Future proof - remotely reconfigurable software upgrade

Deployment Flexibility

- Quality signals over short and long-distance, indoor and outdoor
- Supports base station or off-air feeds
- Supports star, daisy-chain and hybrid fiber topologies
- Unified or separate public safety and cellular systems

Channelized Operation

- Advanced digital signal processing reduces interfering signals and noise
- High-performance digital filtering preserves uplink signal integrity
- Oscillation detection and suppression

Bands and Technology Supported

- VHF (150), UHF (450), 700, 800, 900
- P25 I&II, FirstNet/LTE
- Custom filtering available for UHF & VHF

Certifications and Standards

- UL and FCC certified
- NFPA, IFC510 compliant
- IP66/NEMA 4 compliant enclosures

Avari's Modular Digital DAS System

VL™ Direct Master Unit (VL-DMU™)

The VL-DMU interfaces with Base Stations (BTS) or Bi-Directional Amplifiers (BDA) over analog RF. It converts signals from analog RF and digital data packets and intelligently routes the digital signals through the VL-DMU or directly to/from the remotes. The VL-DMU processes up to four public safety RF bands simultaneously.

VL™ Air Master Unit 33/37 (VL-AMU™ 33/37)

The VL-AMU 33/37 are integrated off-air/-headend units designed for off-air interfacing to public safety base stations. The VL-AMU 33 is a dual or tri-band unit and the VL-AMU 37 is a tri-band unit that respectively filters and amplifies RF signals to a composite power of up to 2W and 5W per band.

VL™ Element Manager (VL-EM™)

The VL-EM is a control unit that centralizes, streamlines, and automates the management and control of system deployments. It has a web browser based graphical user interface.

VL™ Distribution Unit 8/14 (VL-DU™ 8/14)

The VL-DU 8/14 is a digital aggregation distribution unit that receives digital data streams from one or more host units and distributes the data to multiple remote units. The VL-DU also works as an optical port expansion unit featuring 8 or 14 independent optical fiber interfaces.

VL™ Remote Units 33/37 (VL-RU™ 33/37)

The VL-RU 33/37 are mid-powered and high-powered remote radio units that process up to 3 RF bands simultaneously. Its pluggable RF band modules have RF output power of 2W and 5W per band respectively. Convection cooled, the units offer quiet operation and high Mean Time Between Failure (MTBF).

VL™ Clock (VL-CLK™)

The VL-CLK has a built-in 10MHz clock reference signal that is used to feed the same clock reference signal to two separate VL-DMU / VL-AMU units over fiber in a redundant head-end configuration. In order for automatic fail-over protection to work, the two hosts at the headend locations must be synchronized with the same clock reference.

VL™ Series Specifications

Radio Frequency (RF)

- **Frequency Bands Supported:**
  - VHF (150), UHF (450), 700, 800, 900
  - Custom filtering is available for UHF and VHF bands

- **Air Interfaces Supported:**
  - Analog FM, EDACS, P25 Phase I and II, LTE, GSM-R, and TETRA

- **Aggregated Bandwith:**
  - Up to 320 MHz per wavelength

Optical

- **Optical Budget:**
  - 15 to 27 dBo (SFP dependent)

- **Optical Transport Rate:**
  - 9.8304 Gbps

Environmental

- **Operating Temperature:**
  - -30 to 50°C

- **Relative Humidity:**
  - ≤ 95%

- **Standards:**
  - FCC and UL certified
  - Compliant to NFPA and IFC510 standards

- **Enclosures:**
  - IP66/NEMA 4 compliant

VL™ Series Specifications

PRODUCT	SIZE (WxHxD)	WEIGHT
VL-DMU™	19" x 3.5" x 18.4" | 482 x 89 x 466 mm	< 31 lbs. | 14.1 kg
VL-AMU™ 33	17.1" x 27.4" x 8.7" | 434 x 696 x 220 mm	< 81 lbs. | 36.7 kg
VL-AMU™ 37	17.1" x 27.4" x 8.7" | 434 x 696 x 220 mm	< 81 lbs. | 36.7 kg
VL-DU™ 8	19" x 3.5" x 18.4" | 482 x 89x 466 mm	< 31 lbs. | 14.1 kg
VL-DU™ 8	19" x 3.5" x 18.4" | 482 x 89x 466 mm	< 31 lbs. | 14.1 kg
VL-RU™ 33	17.1" x 27.4" x 8.7" | 434 x 696 x 220 mm	< 81 lbs. | 36.7 kg
VL-RU™ 37	17.1" x 27.4" x 8.7" | 434 x 696 x 220 mm	< 81 lbs. | 36.7 kg
VL-EM™	19" x 3.6" x 19.2" | 483.1 x 90 x 488.1 mm	< 26.5 lbs. | <12 kg
VL-CLK™	19" x 3.5" x 18.4" | 482 x 89 x 466 mm	< 31 lbs. | 14.1 kg

In the event of a crisis, public safety personnel and first responders require reliable emergency responder radio coverage.

Being able to communicate with public safety two-way radio systems in buildings is crucial for first responders to execute time-sensitive and mission-critical tasks to protect the public. Emergency Responder Communications Enhancement Systems (ERCES) are often installed to provide these necessary means of communication.

Avari® Wireless's public safety digital Distributed Antenna System (DAS), known as the Avari® VL™ Series, provides a reliable, high-performance, and high-availability system designed to support both current and future public safety communication requirements.

Avari's systems are enabling emergency communications indoors, which helps keep public safety personnel, first responders and the public alike safe.