GATE-1100

The SecureMesh® Gateway is the WAN network interface to the customer’s wired network and root node of the SecureMesh Wide Area Network (WAN). SecureMesh WAN is a high reliability, low-latency, high-bandwidth radio system operating in the 5 GHz band as a self-forming, self-balancing, and self-healing wireless mesh network. Using Time Division Multiple Access (TDMA) to allocate capacity and control access to the network, latency through the SecureMesh WAN is <10 milliseconds per hop within the mesh network. The SecureMesh WAN provides Layer 2 Ethernet transport at air data rates up to 54 Mbps, transmitting raw Ethernet frames to support higher layer protocols, including TCP/IP and a wide range of utility-related application layer protocols such as DNP 3.0, IEC 61850, SCADA-over-IP, and others.

Each SecureMesh Gateway serves as a SecureMesh WAN “base station” and as the root node for the mesh subnetworks that constitute a complete SecureMesh WAN deployment. A Gateway provides the interface between your wired backhaul and the wireless mesh network, routing all its associated SecureMesh WAN traffic to/from the utility head end in order to support Distribution Automation (DA), substation monitoring, video surveillance, and/or work-force management applications as well as the backhaul of Advanced Meter Infrastructure (AMI) and Home Area Network (HAN) traffic.

Synchronous Beam-Switching Technology

In order to provide omni-directional coverage, the Gateway uses a dynamically switched high-gain antenna array of eight separate 45° beams. Patented synchronous dynamic beam-switching technology then coordinates use of each antenna beam to communicate with other WAN nodes.

Reliable Mesh with built in Redundancy

As a root node of the SecureMesh WAN, each SecureMesh Gateway dynamically routes packets to other associated nodes of the SecureMesh WAN. Mesh networking allows coverage to be extended beyond the limit of each node’s radio, avoiding buildings, terrain, and other obstacles to deploy WAN connectivity exactly where it is needed. Additionally, the SecureMesh WAN’s routing algorithms balance the network’s traffic load across all of the deployed Gateways. If a Gateway fails or if it detects that its connection to the head end has failed, its associated WAN nodes will determine new routes to one or more different Gateways within seconds.

Scalable Capacity

Each SecureMesh Gateway and its associated WAN subnetwork provide an overall air data rate up to 54 Mbps and information throughput of up to 20 Mbps, where this capacity is dynamically shared (or explicitly allocated) to support the network’s intended applications, such as AMI and HAN traffic backhaul, DA, video surveillance, or, typically, a mix of these and other applications. Given the low bandwidth requirements of Neighborhood Area Network (NAN) meters and other devices, tens of thousands of NAN nodes are generally supported by each Gateway in addition to the 100s of WAN client devices that can be attached to its associated WAN nodes.

Adding more Gateways to a SecureMesh WAN deployment enhances network reliability and, more importantly, modularly increases the network’s total capacity. The overall SecureMesh WAN capacity is then defined by the total number of Gateways times the throughput through each Gateway.

SecureMesh Gateway

- Base station and root node for all associated SecureMesh WAN nodes, defining a WAN subnetwork
- Provides interface between customer wired backhaul and wireless mesh network

Intrinsic Reliability

- Self-healing mesh supports built in reliability and best-path, vector-based routing
- Adaptive link optimization -- dynamic adjustment of modulation type and FEC based on RF environment

Low-Latency, High-Bandwidth

- Air data rates up to 54 Mbps
- Latency < 10 ms per hop

Simple installation and deployment

- Automatic link discovery
- Self-forming mesh network

Layer 2 Ethernet transport

- Transports raw Ethernet frames to support TCP/IP, DNP 3.0, IEC 61850, and other high-layer protocols

Scalable Capacity

- Total WAN capacity increases with each additional Gateway
- Tens of 1000s of NAN nodes per Gateway
## Functionality

**connectivity**
- SecureMesh WAN base station (root node) and interface to customer wired network
- 10/100Base-T port to/from head end
- RS-232 serial console port for maintenance

**transport**
- Layer 2 Ethernet frames

**clock synch**
- Integrated GPS receiver

**firmware**
- Over-the-air upgradable

**network mgmt**
- SNMP v2c

**traffic prioritization**
- By IEEE 802.1p, protocol type, IP port, IP DiffServ/ToS field, and/or IP address or VLAN address or VLAN ID

**traffic filtering**
- By protocol type, IP port, and/or IP address

**traffic shaping**
- Upstream and downstream per-node rate control

**security**
- Certificate-based node-to-node authentication
- AES-128 encryption

**VLAN**
- IEEE 802.1Q tagging

**VPN**
- IPsec for management traffic

## Power, Physical, & Environmental

**input voltage**
- 24 VDC Power-over-Ethernet
- RJ45 connector

**power**
- Maximum 14 Watts

**surge protection**
- Requires Trilliant p/n: 620-00705-01 surge protector or equivalent weatherproof PoE-compatible 10/100Base-T CAT5 lightning protector (RJ45 or unterminated)

**dimensions**
- Height: 19.8” / 50.3 cm (bracket not included)
- Base diameter: 12.4” / 31.5 cm

**weight**
- 14 lbs / 6.4 kg

**operating temperature**
- -40 °F / -40 °C to +158 °F / +70 °C

**humidity**
- 5 to 95% non-condensing

**installation**
- Mast, tower, utility pole, streetlight pole arm, rooftop

**wind loading**
- Up to 150 mph / 242 km/h

**sealing / locking**
- Tamper seal

**enclosure**
- NEMA Type 4X / IP66

## Compliance

**general**
- CE mark

**unintentional emissions**
- FCC Part 15 Class A
- Industry Canada ICES-003 Class A
- EN 301 489

**radio operation certifications**
- FCC Part 15 Subpart E
- Industry Canada RSS-210
- EN 301 893
- Various worldwide approvals

**FCC AND Industry Canada device IDs**

**safety**
- UL 60950-1, UL 60950-22
- CSA C22.2 No. 60950-1, CSA C22.2 No. 60950-22
- EN 60950-1, EN 60950-22

**environmental**
- RoHS

## SecureMesh WAN Gateway

### Protocols
- SecureMesh WAN Network layer
- SecureMesh WAN MAC layer (beam-switched TDMA)
- IEEE 802.11a PHY

### Modulation
- OFDM with adaptive modulation

### Data Rates
- Up to 54 Mbps (6/9/12/18/24/36/48/54 Mbps)

### Throughput
- Up to 20 Mbps per Gateway

### Frequency Bands
- 5.2500 to 5.8500 GHz, including:
  - US: 5.250 – 5.350 GHz U-NII mid
  - US: 5.470 – 5.725 GHz U-NII worldwide
  - US: 5.725 – 5.850 GHz U-NII upper

### Channel Width
- 20 MHz

### Transmit Power
- 24 dBm typical (at radio antenna port)
  - Configurable as needed for worldwide regulatory compliance

### Receive Sensitivity (3% FER; at ant. port)
- -93.0 dBm @ 6 Mbps
- -90.5 dBm @ 9 Mbps
- -89.0 dBm @ 12 Mbps
- -87.0 dBm @ 18 Mbps
- -83.0 dBm @ 24 Mbps
- -81.0 dBm @ 36 Mbps
- -73.0 dBm @ 48 Mbps
- -71.0 dBm @ 54 Mbps

### Antennas
- 8 integrated antenna sectors, 360° coverage
  - +18 dBi gain per antenna sector
  - 45° azimuth, 6° elevation per antenna sector