

Bridge Family



Enabling robust communications for Distribution Automation

The Silver Spring Smart Energy Platform combines network infrastructure, software, and professional services to enable a range of smart grid applications. The Bridge family provides robust, two-way RF standards-based communications to support Distribution Automation applications such as asset management, Volt/VAR control, self-healing circuits, FCI communications, and distributed generation.

The Silver Spring Bridge family provides standards-based, industrial RF communications to link Remote Telemetry Units (RTUs) to SCADA systems. The Bridges enable utilities to support multiple independent DA applications over a single RF infrastructure without sacrificing application or security requirements.

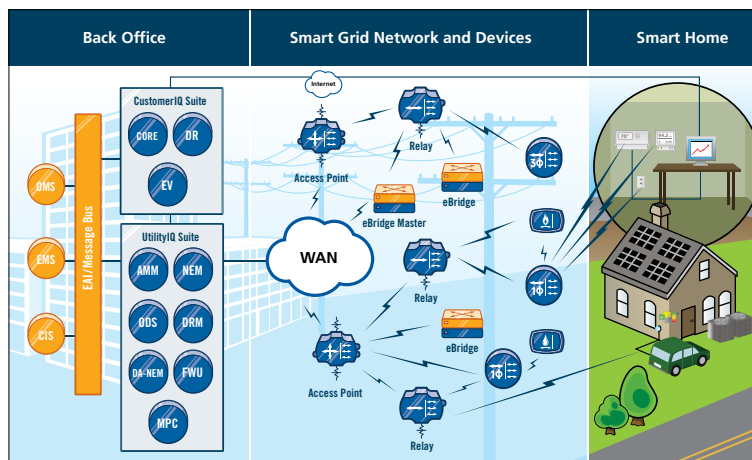
Features:

- » Real-time and secure two-way RF data connectivity linking RTUs to the utility network
- » Standards-based connectivity for serial DNP3, DNP3/IP over Ethernet, or mixed serial/Ethernet communications
- » Proven interoperability with a variety of RTU and SCADA vendors
- » Security via per-Bridge embedded firewall, RTU-to-SCADA IPsec encryption, and packet filtering
- » Interference-avoiding Frequency Hopping Spread Spectrum and per-device spectrum scanning to ensure message delivery
- » Flexible deployment options for dedicated DA communications network or prioritized traffic on a multi-application smart grid
- » Redundancy options for mesh connectivity, network management, take-out points, and power supplies
- » Routing control to match application requirements including designating latency levels, battery-backed routes, and best or fixed take-out points
- » Hardened form factor to satisfy requirements for electrical substations and enclosure installations
- » Evolvable architecture that scales from two units to tens of thousands, with the ability to gracefully migrate from serial DNP3 to IPv4 to IPv6 as needed

In Distribution Automation, utilities have long understood the benefits of fully connecting SCADA systems to field-based telemetry and control devices via robust, two-way communications. SCADA network operators, however, have struggled to gain these benefits using traditional RF communications options that are proprietary, unreliable, and insecure and that lack sufficient performance.



The eBridge provides Ethernet and serial connectivity for DNP3 support on DA communications networks, and the sBridge supports multiple serial connections for simultaneous DNP3 and management port access to the RTU.

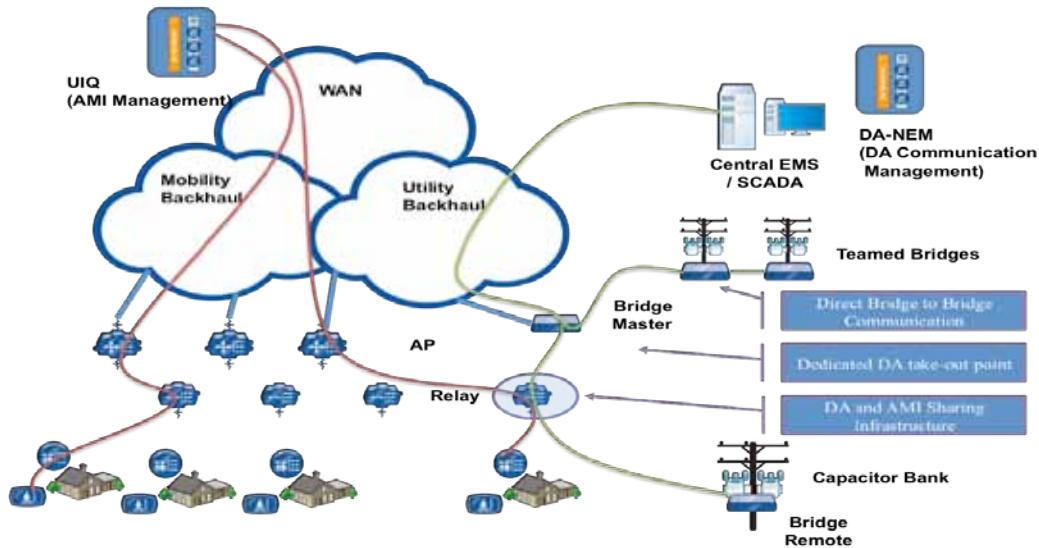


An advanced, IP-based network enables the smart grid—from the data center to the customer premise.

About Silver Spring Networks

Silver Spring Networks is a leading Smart Grid solution provider that enables utilities to achieve operational efficiencies, reduce carbon emissions and empower their consumers with new ways to monitor and manage their energy consumption. Silver Spring provides the hardware, software and services that allow utilities to deploy and run multiple advanced solutions, including Smart Metering, Demand Response, Distribution Automation and Distributed Generation, over a single, unified network. The Silver Spring Smart Energy Platform is based on open, Internet Protocol (IP) standards, allowing continuous, two-way communication between the utility and devices on the grid. Silver Spring has numerous deployments with leading utilities in the US and abroad, including Florida Power & Light, Pacific Gas & Electric, Pepco Holdings, Inc., Jemena Electricity Networks Limited and United Energy Distribution, among others. For additional information, please visit www.silverspringnetworks.com.

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Utilities can choose to share common Silver Spring network infrastructure in supporting DA networks with Bridges.

In support of DA communications, utilities can deploy Bridges fully independent of or overlaid with a Silver Spring AMI installation. In the converged or overlay model, the utility can enjoy significant cost advantages while employing application-level prioritization to protect latency-sensitive RTU traffic from AMI traffic.

The Silver Spring implementation allows utilities to design the Bridge RF network to meet application and security requirements rather than be limited by the constraints of the RF communications devices.

Example deployment scenarios include:

- » Serial-only networks – to match DA devices needs or to avoid IP routing in substations for security concerns
- » Mixed IP/serial networks – to bridge serial technology into IP-enabled SCADA systems
- » Direct RTU-to-RTU peer communications – to support latency-sensitive applications such as self-healing circuits
- » Hub-and-spoke connectivity – to support asset management, central monitoring, and transport of device control messages

Security as a core component

Silver Spring views security not as a set of features but rather as an integral part of the smart grid. As a result, security is core to the entire Smart Energy Platform. Silver Spring's security implementation mitigates concerns about evolving security standards by adhering to the security industry's most current algorithms and standards.

Supported techniques include:

- » **Pseudo-random frequency hopping sequencing:** Silver Spring's per-device hopping sequence is a method long used for secure military communications.

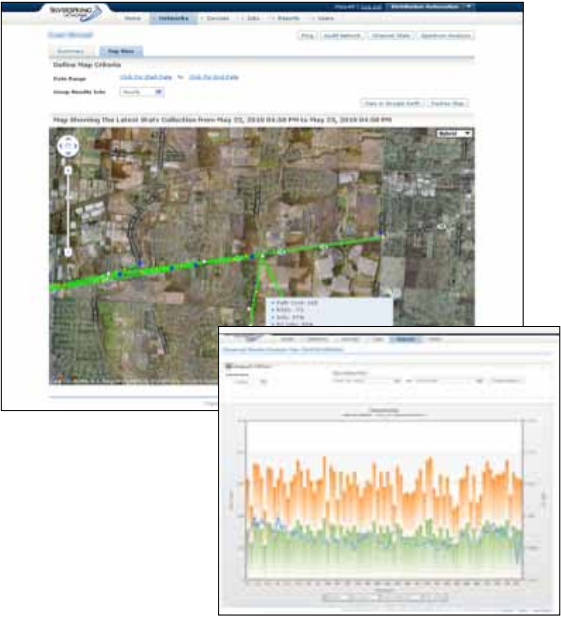
- » **Private networks:** All implementations reside on private networks with no connection to the public Internet.
- » **RSA-signed firmware:** This integrity checking technique ensures captured devices will not accept the loading of malicious code.
- » **Network authentication through customer-specific PKI certificates:** On-board certificates block address-spoofing devices from accessing the network. The Silver Spring approach requires two-way authentication through automatically managed X.509 certificates.
- » **End-to-end IPsec tunnels:** Encrypted tunnels can protect the entire traffic flow from the RTU to the RF network edge or to an IPsec-supporting firewall adjacent to the SCADA system, in contrast to the payload-only or RF-only protection enabled by AES encryption.
- » **Fully configurable, per-device firewall:** Silver Spring delivers a fully configurable packet-level application firewall rather than simple list-based packet security.

Giving control back to the operator

For the Bridge network operator, managing the RTUs, IEDs, and PLC devices connected to the Bridges is more important than managing the Bridges themselves. Consequently, Silver Spring has focused on delivering powerful yet intuitive tools to simplify the task of network management, in the field or a central communications center.

Distribution Automation-Network Element Manager (DA-NEM) stands at the center of Silver Spring's Bridge management toolset. Easy to use without sacrificing capability, DA-NEM provides central configuration management and archiving; statistics, events gathering, and archiving; and complete firmware control. DA-NEM displays network activities in Google Earth and allows the utility to see what Bridges are connected to which meters or RTUs. Built on a world-class embedded database, DA-NEM offers utility-grade scale and reliability.

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The management application for Bridge networks, Distribution Automation-Network Element Manager, provides visualization of devices and network status on Google Maps/Earth and displays spectrum analysis of RF performance.

The Bridge Configurator is laptop-based software that allows quick network setup for testing or evaluation and on-site network device configuration or status.

Services for smart grid Bridge deployment

Consistent with all of its offerings, Silver Spring offers a complete set of Bridge network design, testing, training, and deployment services to take the project from conception to conclusion or to augment existing staff at a utility.

Silver Spring can ship Bridges directly to a utility or can work with an RTU vendor to incorporate the Bridge within the RTU for integrated delivery to the utility.

Specifications:

Communications	Data rate: 100 Kbps Frequency: 902-928 MHz Spread spectrum technology: FHSS Transmitter output: 30 dBm Output impedance: 50 ohms Receiver sensitivity: -97 dBm for 1% PER Antenna connector: SMA, Female Antenna: Various Serial: eBridge – 1 x RS-232, DB9, Female, DCE sBridge – 2 x RS-232, DB9, Female, DCE Serial data rates: 2400 bps to 115 Kbps Ethernet: eBridge – 1 x RJ45, 10/100 Base-T
Protocols/Security	Addressing: Internet Protocol version 4 (IPv4) and version 6 (IPv6) Security: L3/L4 firewall, IPsec tunnels (Bridge to Bridge, Bridge to VPN concentrator) and Secure bootloader Serial: Encapsulation within IP (tunneling) for asynchronous serial (DNP3)
Physical Interfaces	Antenna connector: N Type, Female Antenna: J-Pole or High-Gain Directional
Power	Input range: eBridge – DC 11-60v sBridge – DC 10-30v POE: eBridge – 802.af (class 2) Power consumption: eBridge – 0.8 W (idle), 5 W (TX), 9 W (max) sBridge – 0.8W (idle), 5 W (TX), 8 W (max)
Environmental	Operating temperature: -40°C to +85°C (-40°F to +185°F) Humidity: 0% to 95%, non-condensing
Mechanical	Dimensions: eBridge - 15 cm (6") L x 14 cm (5.5") W x 4.2 cm (1.75") H sBridge - 11.4 cm (4.5") L x 6.3 cm (2.48") W x 1.8 cm (0.7") H Weight: eBridge – 425 g (15 oz.) sBridge – 417 g (14.7 oz.) Enclosure: IP50, blue, aluminum
Approvals	FCC: Part 15.247 Industry Canada: RSS-210