

evolution™ Fixed Network Advanced Metering Infrastructure

an Overview



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1. Introduction

Elster AMCO Water's evolution™ Advanced Metering Infrastructure overview

Elster AMCO Water's evolution™ Advanced Metering Infrastructure (AMI) is a fixed network running a web-based application on a Ground Server and an evoNet™ Manager Server that handles two-way communication via the evoGate™ gateway.

The evoGate is referred to as a 'gateway' because it is the gate between the 902 to 928 MHz evolution Radio Transceiver Module (evoRTM™) Local Area Network (LAN) and Wide Area Network (WAN) backhaul via a General Packet Radio Service (GPRS) cellular radio or Ethernet connection. The evoGate is also referred to as the Central Collector because it collects metering data from all of the evoRTM/meter pairs in the network. As such, the evoGate unit shall be referred to as the evoGate Central Collector in this document.

The evoGate Central Collector provides two-way communications on both the network side and on the WAN side. This capability enables the utility company to acquire readings on demand and to receive information regarding events such as leaks, tampering, low battery conditions and reverse flow or backflow.

Figure 1 illustrates the interactions of the components of an Elster AMCO Water evolution AMI system and this document briefly discusses each.

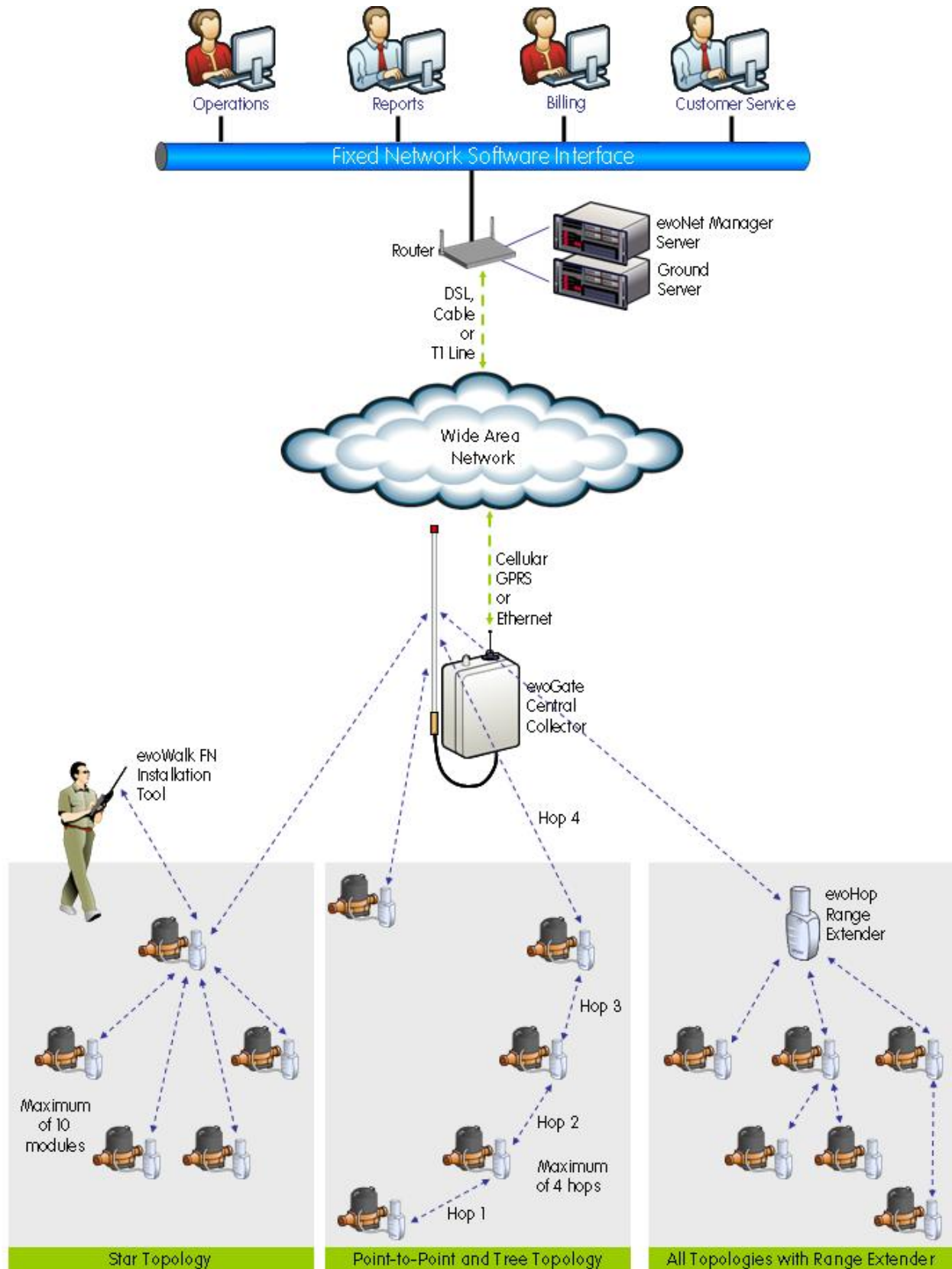


Figure 1: Elster AMCO Water provides all components for a fixed AMI network.



2. System components

evolution AMI fixed network components

The following is a listing of the components that make up the evolution AMI Fixed Network:

- evoRTM Radio Transceiver Modules
- evoHop Range Extenders
- evoGate Central Collector
- evolution Ground Server
- Router
- evoNet Manager
- evoWalk Fixed Network (FN) handheld field units

evoRTM Radio Transceiver Modules

The evoRTM endpoints are 'Smart' components of the Elster AMCO Water fixed Advanced Metering Infrastructure network that collect and analyze information directly from the water meter register. The evoRTM endpoints can be installed some distance from the meter, using a 3-conductor cable, or in a pit with the meter using a pit-mount interface. For some new installations, the evoRTM endpoint and the water meter can be purchased as a single unit.

An evoRTM is required for each meter register that is read in an AMI fixed network. The meters and evoRTM endpoints exist at the data-collection end of the network. As such, they are rightly referred to as 'endpoints'. The evoRTM endpoints operate within the 902-928 MHz Industrial, Scientific and Medical (ISM) frequency range in a fixed network.

Because the evolution AMI system operates as a deterministic, or modified, mesh network, the evoRTM can work in several different configurations. The different configurations allow direct communication with other evoRTM endpoints, an evoHop range extender or directly with an evoGate Central Collector to ensure effective and consistent transfer of information.





The evoRTM endpoints are able to use other nearby endpoints as relays or repeaters to get data back to the evoGate Central Collector. As shown in Figure 1, each relay through another evoRTM is called a 'hop'. The system allows up to four hops to get from the source evoRTM endpoint to the evoGate Central Collector using three other evoRTM endpoints as relays in between. This is otherwise known as a 'tree' topology. The evoRTM endpoints can also configure themselves in a 'star' topology where multiple endpoints can report through a single endpoint. In Elster AMCO Water evolution fixed network 'star' configurations, a single evoRTM endpoint can support up to 10 other direct connections to other evoRTM endpoints. Greater distances require an evoHop Range Extender.

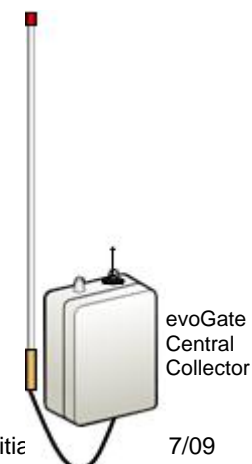
A deterministic, or modified, mesh network reduces latency in retrieving meter data because the system knows exactly where to go to acquire data - unlike a 'full' mesh network where devices blindly transmit data to any other device in the system. Random paths can affect the battery life of devices by increasing the number of devices and the amount of data each handles from different directions on the way to the central collector. The evolution AMI system configures itself to optimize the number of hops and connections between the evoRTM Endpoints to ensure that no one endpoint is handling an excessive amount of traffic, which would possibly shorten battery life. As a result, long battery life for all modules in the network is ensured.

evoHop Range Extenders

The evoHop range extenders are wireless relays designed to extend the operating range of evoRTM endpoints in a fixed network. The evoHop units look and perform similarly to evoRTM endpoints but are not programmed or connected to a water meter register. The number of evoHop units required for a fixed network varies depending on the topology, as well as the number and location of evoRTM endpoints and evoGate Central Collectors. An Elster AMCO Water Tech Support Specialist completes a detailed survey to determine the required number and location of evoHop units.

evoGate Central Collectors

evoGate Central Collectors are the evolution network-to-cellular GPRS gateways and serve as central collecting points for meter data. evoGate Central Collectors communicate with the evolution Ground Server either via cellular GPRS or through an Ethernet connection.





The number of evoGate Central Collectors required for a fixed network varies depending on the number and location of evoRTM endpoints and evoHop units. An Elster AMCO Water Tech Support Specialist completes a detailed survey to determine the required number and location of evoGate Central Collectors.

GPRS communication requires that a unique SIM card be installed in each evoGate Central Collector. An Elster AMCO Water Technical Support Specialist will assist with the procurement and activation of each SIM card before installation. Like any cellular device a monthly fee is assessed to the utility company for each GSM/GPRS access point.

evolution Ground Server

The evolution Ground Server is the bridge between the evoGate Central Collectors and the evoNet Manager Server, where the main application resides. In order to exchange commands between the evoGate Central Collectors and the evoNet Manager Server, the evolution Ground Server must have a dedicated Internet connection. Elster AMCO Water recommends at least a 3Mb/s dedicated connection using DSL or high speed cable through an Internet Service Provider (ISP).

The evolution Ground Server is configured and tested with Microsoft® Windows® 2003 Server SP2 software by an Elster AMCO Water Tech Support Specialist. Additionally, the Elster AMCO Water Tech Support Specialist installs and activates the Ground Server software required for the fixed network.

Router

The evolution Ground Server communicates with the evoNet Manager Server via a router. The router ensures effective and consistent communication between the evolution Ground Server and the evoNet Manager Server.



evoNet Manager Server

The evoNet Manager Server is the server component in a fixed network that stores and manages evoRTM endpoint data. The evoNet Manager software uses Oracle or MySQL databases to manage the data. Standard reporting options in the evoNet Manager application include:

- Consumption (high/low)
- Negative or Zero Consumption
- Tampering or Misreading
- Unassigned or Hard-to-read evoRTM
- General Readings and Leak Detection
- General Statistics and Collector Status

The evoNet Manager Server is shipped to Elster AMCO Water where an Elster AMCO Water Tech Support Specialist installs and activates the evoNet Manager software.

evoWalk fixed network handheld field unit

An AMI fixed network includes an evoWalk FN handheld device provide technicians a tool to communicate and debug evoRTM endpoints in the field. It is necessary to communicate with evoRTM endpoints in the field if two-way communication between the endpoint and the evoGate Central Collector is lost, and to repair and replace evoRTM endpoints in the field.

The evoWalk FN handheld mobile unit is configured and tested by an Elster AMCO Water Tech Support Specialist. Training is also provided to the utility's field service personnel.





3. Service and support

Elster AMCO Water Customer Service

The Elster AMCO Water Customer Service Team can be contacted during the following hours:

Monday through Friday – 8:00 AM to 5:00 PM EST, excluding holidays

You can reach the Customer Service Team by calling:

1-866-896-8858

Elster AMCO Water Technical Support

Elster AMCO Water Technical Support Specialists are a highly skilled group of individuals who have been selected for their dedication to customer satisfaction. The Technical Support Team is on call during the following hours:

Monday through Friday – 8:00 AM to 5:00 PM EST, excluding holidays

You can reach the Technical Support Team by calling:

1-866-896-8879

Please note: If you are calling after hours, or a technical support person is not immediately available, you will be directed to a voice mailbox. Please leave your name and number along with your question or a brief description of the issue. A tech support person will return your call as quickly as possible.

Email: techsupport@us.elster.com



4. Revision history

New Revision Number	Changes	Revision Date
Rev 0	Initial Release	07/17/09

About Elster AMCO Water, Inc.

Located in Ocala, Florida, Elster AMCO Water is part of Elster, the world's largest metering and smart metering systems solutions company. Elster AMCO Water is an industry leader in the development and implementation of innovative metering and system solutions and is committed to delivering superior customer service, quality products, solutions and services to the water utility industry.

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