network client.	
10. A method as claimed in claim 1, further comprising the steps of:	*See* Claim 1 above.
10(a) receiving responses to the message from the recipients having the selected group address and determining which recipients have not yet received the message; and	*See* Claim 1(a – g) above. GE determines which recipients have not yet received the message from responses received from grouped recipients. Outage management is a valuable example of the information used by GE system users when this claim is performed.
10(b) sending message progress notifications to the network client indicating how many of the recipients corresponding to the selected group address need to acknowledge receipt of the message.	Status notifications are sent to the network client indicating response or acknowledgement receipt status of the message. *See* Claim 1(f-g) above.
13. A method as claimed in claim 1, wherein the message broadcast to the recipients corresponding to the selected group address comprises a	*See* Claim 1(a-g) above. Grid IQ systems broadcast messages with message identifiers (e.g., event IDs, message numbers, etc.) and associate received responses with message identifiers. Stored procedure calls are associated with received responses from Grid IQ

message identifier, and further comprising the steps of: associating received responses from recipients having the selected group address with the message corresponding to the message identifier.	endpoints.
14. A method as claimed in claim 1, wherein the storing step comprises the steps of: storing at least one of a symbolic name and a corresponding encryption key for each of a number of group addresses; and replicating via wireless transactions the at least one of symbolic name and a corresponding encryption key in a memory device of the recipient for each of the group addresses to which a	*See* Claim 1 above. End-to-End Security by Design An effective way to develop a highly secure system is to start from the ground up with cyber security needs in mind. Security mechanisms cannot be implemented as "bolt on". Security must be built into the design to be most effective. The Grid Modernization Infrastructure network leverages the broad capabilities of GE by looking across various industries such as Internet and Telecom, where security techniques are mature, to utilizing best practices for mutual authentication (valid endpoints will join valid networks), application message integrity and replay protection, data packet confidentiality, limited anonymity, and authentic firmware upgrade. Taking this into account a comprehensive approach to information security was designed into the system with: Exhibit 1.

recipient belongs.	• Prevention mechanisms to provide access control, integrity protection, confidentiality, and availability. • Detection mechanisms to detect attempts to break into the system. • Recovery mechanisms to ensure system continues to operate as desired and degrades gracefully. Well recognized and time-tested security mechanisms are required to achieve these goals. The following security mechanisms are implemented and are best suited for a network that is a point-to-multipoint topology, bandwidth efficient and power maximizing: • Symmetric key algorithms • AAA key management server with diameter protocol • CMAC (AES 128-bit) for Over-the-Air (OTA) message integrity and node authentication • 3-key TDES (192-bit) for link layer confidentiality and AES-128 bit encryption for application data confidentiality • No OTA key exchange • SSL encryption for back-end IP infrastructure • Authentic firmware upgrade Exhibit 1.

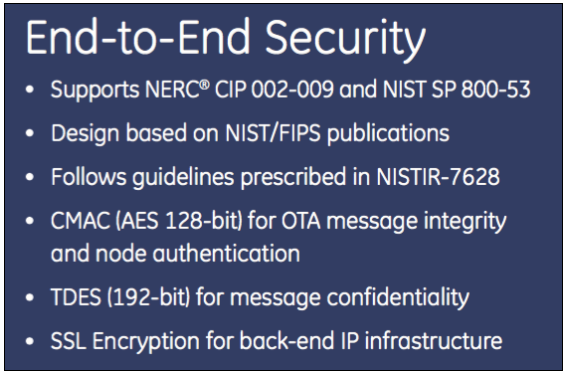


Exhibit 8.

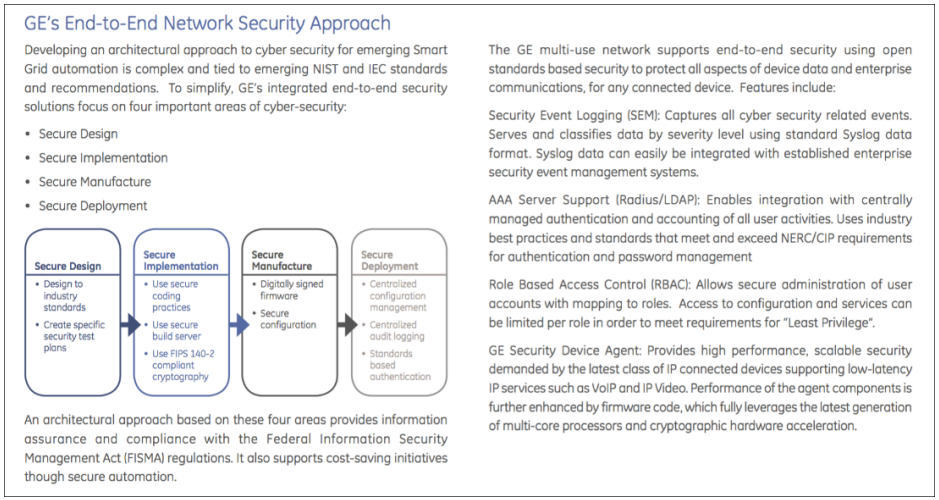
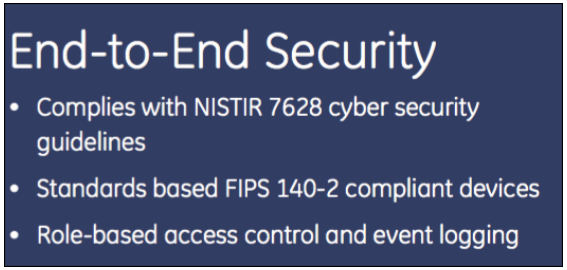


Exhibit 13.

	 Exhibit 13.
17. A method as claimed in claim 1, wherein the storing step further comprises the steps of:	*See* Claim 1(a-g) above.
17(a) maintaining a database for storing data relating to the recipients, the groups and the memberships of recipients to various ones of the groups; and	GE Grid IQ systems include a database maintained in operation for storing data relating to the recipients, the groups, and correspondence between recipients and groups. *See, e.g.*, Claim 1(b) above, describing how the GE system stores data relating to recipients. Grid IQ head-end system components, associated databases, and data repositories are used to maintain and store recipient data.
17(b) performing wireless configuration transactions to synchronize the memories of respective ones of the recipients	GE Grid IQ systems perform "on-air" wireless configuration transactions and firmware downloads to synchronize with the GE database GE meter firmware, configurations, etc.

with the database.	Grid IQ and the Accused Instrumentalities discussed above regarding the wireless network elements of claim 1 are used to perform wireless synchronization and configuration. Various Grid IQ systems may communicate with endpoints to configure particular functions or modules, and these steps may be carried out by specific parts of the Grid IQ deployment that are not publicly known.
18. A method as claimed in claim 17, wherein the performing step comprises the steps of: replicating at least one of group membership configuration information and group encryption keys to the recipients; and receiving confirmation responses from the recipients relating to updating of the at least one of group membership configuration information and group encryption keys in their respective memories.	See detail for claims 1 and 17 above. GE Grid IQ systems replicate encryption keys to recipients and receive related acknowledgements.
20. A method as claimed in claim 1, wherein the transmitting step comprises the step of immediately replying to the communication	*See* Claim 1(a-g) above and (a-c) for further detail regarding the transmitting step. Acknowledgements responsive to the communication from the network client confirm receipt and indicate recipients having the selected group address. The head-

from the network client requesting wireless transmission of the message to the selected group address with the identifying addresses of the recipients having the selected group address.	end system responds to the network client with acknowledgements to the Grid IQ administrative console or management screen confirming transmission was initiated to group of endpoints.
21. A method as claimed in claim 1, wherein the step of broadcasting the message comprises the step of: encrypting the message using an encryption key assigned to the selected group address and provided to the recipients sharing the selected group address.	See claim 1 above including detail regarding broadcasting step. GE Grid IQ systems encrypt messages using encryption keys shared with group members.
22. A method as claimed in claim 1, wherein the step of broadcasting the message comprises the step of assigning a message sequence number to the message, and the step of receiving the	See claim 1 above. Grid IQ systems broadcast messages with assigned message sequence numbers. Grid IQ systems receive acknowledgments from recipients with primary address and sequence numbers. For example:

acknowledgement responses from the recipients comprises the step of providing in at least one of the acknowledgment responses the primary identifying address of the corresponding one of the recipients and the message sequence number to uniquely identify a specific group message at the corresponding one of the recipients.	
29. A method as claimed in claim 1, wherein the broadcasting step comprises the step of transmitting a group alert message to the recipients sharing the selected group address via the paging network using a single network transaction.	*See* Claim 1(a-g) above and (a-c) for further detail regarding the transmitting step. "Actions" are created and performed to broadcast a group alert to a group of recipients in a single network transaction.

'959 Patent – Claim 30 – GE Grid IQ System	
30 (a) An apparatus for alerting a group of recipients over a wireless network,	To the extent the preamble is limiting, the GE Accused Instrumentality identified and detailed with respect to claim 1 above is an apparatus for alerting a group of recipients over a wireless network.

each recipient comprising a mobile device having a two-way wireless communication function, the apparatus comprising:	*See* 1(a) above. GE endpoints comprise a mobile device for communication on a wireless network. The particular wireless network and protocol depends upon the deployment. But Grid IQ and Choice Connect systems are capable of two-way functionality.
30 (b) at least one of a memory device and an interface to an external memory device for storing for each recipient an assigned primary identifying address and one or more group addresses that are shared with selected ones of the other recipients;	*See* claim 1 above, including particularly claim 1(a) – 1(b). GE's Grid IQ infrastructure includes a memory device (or an interface to an external memory device) for storing, for each endpoint device, an assigned primary identifying address.
30 (c) a network client interface for receiving a communication from a network client requesting wireless transmission of a message to recipients sharing a selected one of the group addresses;	*See* 1(c) above.

30 (d) a processing device connected to the memory device, the network client interface and the wireless communication network interface, the processing device being programmed to transmit a communication to the network client comprising group information relating to the selected group addresses, the group information comprising at least one of the number of the recipients having the selected group address and the identifying addresses of the recipients having the selected group address,	See 1(d) above. Transmissions of group communications include unique identifiers for individual smart meters (e.g., Device ID's or Network Addresses.) The base station broadcasts actions to a group of smart meters via a wireless network.
30 (e) broadcast the message to the selected group address via the wireless communication network and the wireless communication network	*See* 1(e) and 30 (c) above.

interface,	
30 (f) receive acknowledgment responses from the recipients sharing the selected group address via the wireless communication network in response to the message, the acknowledgement responses each comprising at least one of an indication of successful receipt of the message and an indication that the message was read by the recipient that transmitted the corresponding acknowledgement response,	*See* 1(f) above.
30 (g) store, for each recipient having the selected group address, a recipient identifier and a corresponding message	*See* 1(g) above.

alert status indicator indicating at least one of the message has been received by that recipient, and the message has been sent but not yet received by that recipient, depending on when that recipient transmitted its corresponding acknowledgement response, and	
30 (h) provide at least one of the acknowledgment responses and the stored message alert status indicator for each of the recipients to the network client to determine message alert status for each of the recipients in the	*See* 1(g) above.

group corresponding to the selected group address including at least identifying which of the recipients received the message and which of the recipients have not yet received the message.	

EXHIBIT B

GroupChatter, LLC v. GE Civil Action No. 15-cv-486-WSD
Plaintiff's LPR 4.1 INFRINGEMENT CONTENTION CLAIM CHART – U.S. PATENT NO. 8,199,740

GroupChatter presently asserts GE infringes claims 1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 15, 16, 20, and 21, directly and indirectly. This chart sets forth Plaintiff's infringement contentions relating to the '740 Patent and the GE Accused Instrumentalities. Identification of the Accused Instrumentalities is made here with as much specificity as possible with model names or numbers and methods provided if known. Specific configurations and deployed elements of the GE Accused Instrumentalities may differ, and the specifics of each deployment are not generally available to the public.

These contentions articulate the structure and acts that constitute direct infringement of the '740 patent and identify specifically where each element of each asserted claim is found within each Accused Instrumentality. This disclosure is not intended to describe all acts of inducement or contributory infringement GE has and continues to commit by providing, developing, installing, testing, deploying, and directing the use of GE Accused Instrumentalities by GE customers and end users. As discovery proceeds, these contentions and the specific GE components identified here as meeting certain claim elements or performing certain claim steps may change in view of claim construction and additional information learned through discovery.

Claim 1 – GE Systems	
1. (a) A method of alerting a group of recipients over a wireless network and providing acknowledged group messaging, each recipient comprising a mobile device capable of transmitting and receiving data, the method comprising the steps of:	GroupChatter contends the preamble is not limiting. In the event the preamble is found to impose a meaningful limitation on the scope of the claim, the GE Accused Instrumentalities as described in more detail below and generally described by GE as "Smart Metering Systems" operate to perform each and every step of the claimed method of alerting a group of recipients over a wireless network and providing acknowledged group messaging with two-way endpoints. *See* GE claim chart – '959 Chart at 1 (a). GE performs the method by operating Grid IQ and related systems

	(described in the '959 Chart) which include one or more wireless networks as described in the '959 Chart. The GE systems include a wireless network for alerting groups of recipients. GE uses the systems to alert groups of recipients over the wireless network and provide acknowledged group messaging. Endpoints (e.g., meters) with modules acknowledge receipt of messages. Accused Instrumentalities include GE Grid IQ AMI systems, Grid Solutions, Grid IQ AMI P2MP Solution, GE's MDS wireless product portfolio, MDS PulseNET, GE Grid IQ Connect SaaS, Grid IQ Connect, GE Wireless AMI, Grid IQ Network Communications Platform, RF Mesh, Smart Grid Communications Solutions, Communications Infrastructure for Grid Applications, MDS Orbit Platform, SMOS Smart Metering Operations Suite, GE Digital Energy Grid IQ Solution, GE DRMS and related or analogous systems (collectively referred to herein as Grid IQ, GE Grid IQ AMI, GE System(s) or similar terms). Accused Instrumentalities further include storage (e.g., servers, databases, etc.,), programs (e.g., applications, etc.), hardware (e.g., transmitters, repeaters, collectors, communication modules, endpoints) referred to herein (by way of example) that relate to the patent claims as outlined herein to provide customers with AMI products, services, and solutions. Accused Instrumentalities include GE Grid IQ AMI systems and related subsystems (e.g., Grid Solutions). To the extent the preamble is limiting, GE (and/or GE customers) performs the method, (including alerting groups of recipients) by making, using, selling, and operating Grid IQ AMI systems and analogous systems. Accused Instrumentalities include deployments operated or built

with partners (e.g., Silver Spring Networks, Consert, etc.).

> Of course, each utility's smart grid needs will be different. In Norcross, GE is working with startup Consert (../articles/read/consert-claims-faster-more-complete-home-energy-network/), which will offer real-time home energy sensors and controls over a 3G cellular network, Carlson said. That's a big project for Consert, which won a GE Ecomagination investment (../articles/read/ge-announces-ecomagination-challenge-winners/) last year and is also backed by Qualcomm and Verizon (../articles/read/consert-claims-faster-more-complete-home-energy-network/).

Exhibit 29.

> "Consert and 3G are part of our go-to-market strategy," Carlson said, though he made it clear GE would also support mesh networking and other common smart meter communications technologies. Still, it's a good plug for cellular smart grid, as well as an interesting example of one smart grid platform making use of an existing communications system, rather than building its own. GE hasn't picked a cellular provider for the project yet, Carlson said.

Exhibit 29.

The Grid IQ AMI P2MP Solution has exceptional coverage and supports multiple applications on the same network. This single network features pervasive coverage for metering and distribution grid monitoring and sensing regardless of whether the devices are battery operated or powered. Each access point in the system supports thousands of connected devices providing unicast, downlink multicast and broadcast capabilities and supports group configuration and control. The ability to leverage a common network infrastructure for multiple

	applications provides immediate and significant ROI. Exhibit 1. *Remote "Endpoint" devices, such as utility smart meters or fault indicators, communicate directly with the "Access Points" deployed either on towers or utility poles allowing for flexible low cost deployments. An Endpoint a is device containing a small RF module designed for easy integration and ultra-low power operation in Smart Meters or sensors. A network of Access Points can provide redundant coverage for a wide area, such as a city or a county and has industry leading range enabling ubiquitous coverage. The Access Point is designed for indoor or outdoor operation and can be easily deployed on buildings, utility poles or communication towers enabling low cost pervasive coverage in the most challenging environments.* Exhibit 1. *from wellhead monitoring to utility substation automation, our wireless devices are packaged for industrial environments and have been rated and tested to harsh industrial specifications. Our wireless networks carry serial and IP/Ethernet traffic, plus analog and digital I/O signals connected directly to field devices and sensors, accommodating an extensive array of industrial protocols.*

Exhibit 16.

Grid Solutions, a General Electric and Alstom joint venture, is serving customers globally with over 20,000 employees in approximately 80 countries. Grid Solutions helps enable utilities and industry to effectively manage electricity from the point of generation to the point of consumption, helping to maximize the reliability, efficiency and resiliency of the grid.

Exhibit 16.

Exhibit 32.

Covering GE's MDS wireless product portfolio, from data acquisition to backhaul, MDS PulseNET is capable of creating, storing and software trending derived metrics using built-in program logic. MDS PulseNET software provides warning performance thresholds that can trigger exception events, which in turn can trigger specific actions, such as sending messages to trouble ticketing systems or other management systems.

Learn more about our MDS PulseNET solutions.

Exhibit 32.

Residential ANSI® Meters (http://www.aclara.com/products/smart-meters/ansi-smart-meter/residential-ansi-meters-2/)

I-210 Series

The I-210 Series of single phase electronic meters offers a wide range of functionality with a design that is a powerful combination of accuracy, reliability and value. Set apart by their industry leading quality, these meters come with various integrated communication technologies as well as a fully rated service switch.
Learn More. (http://www.aclara.com/products/smart-meters/ansi-smart-meter/residential-ansi-meters-2/)

Exhibit 9.

kV2c Series

The kV2c Series of commercial and industrial meters moves beyond revenue metering to real-time instrumentation, true power quality monitoring and real cost of service measurements. Applications range from simple energy rating to collecting load analysis information on a polyphase or single phase circuit, and our patented Fitzall™ feature allows for inventory reductions.
Learn More. (http://www.aclara.com/products/smart-meters/ansi-smart-meter/commercial-and-industrial-ansi-meters/)

Exhibit 9.

kV2C

Aclara Meters' most advanced electricity metering product, the kV2c, delivers world class capability around revenue metering and protection, power quality, and cost of service measurements. Designed around a proprietary data acquisition chip, this product delivers advanced sampling and data analytics capability.

Versatility
The kV2c meter family is a versatile metering platform for commercial and industrial applications. The kV2c meter offers easy and powerful functional upgrades with a unique combination of soft switches and option boards to meet your metering needs in a rapidly evolving smart metering space. The kV2c starts as a bi-directional, coincident demand meter with five demand measures, real-time pricing, and real time data monitoring. Soft switches, or firmware upgrades, are available to add such functions as TOU, transformer and line loss compensation, power factor, 4 quadrant measurements, instrument transformer correction, and increased recording channels.

Inventory Management
The kV2c wide range voltage power supply (120V to 480V) combined with the Fitzall™ feature enables a significant meter inventory reduction while covering many applications. Fitzall™ is a Aclara Meters exclusive tool for commercial and industrial electronic meter inventory reduction, which allows two meter forms, 9S for transformer rated and 16S for self-contained to meter any service type.

Exhibit 24.

kV2c Family

Aclara Meters' kV2c meter family is designed for revenue class metering in commercial and industrial applications. The kV2c meter moves beyond revenue metering to real time instrumentation, true power quality monitoring and real cost of service measurements. Whether you are metering the simplest energy rate or collecting critical quality of service and load analysis information on a polyphase or a single phase circuit, there is a kV2c meter configuration to meet your needs.

The Aclara Meters kV meter family, including our most advanced kV2c family of meters, is a widely accepted ANSI Commercial & Industrial meter with over 3.5 million units deployed in the field since its introduction. The robust revenue-grade meter design is based on cutting edge technology that provides the highest accuracy and reliability in the market. The Aclara Meters kV2c product family includes 2 models to provide the ultimate in flexibility and customer choice, including the first to offer a polyphase product for 600V 3-phase, 3-wire service.

The I-210 product family includes 2 models to provide the ultimate in flexibility and customer choice:

- kV2c
  This is Aclara Meters' flagship meter product offering all of the required revenue grade metering functionality and advanced power quality monitoring for polyphase metering. Learn More.
- kV2c+
  Ideal for extremely harsh environments, this model builds on our kV2c design and includes a more robust power supply and suitability for 600V applications. Learn More.

Exhibit 25.

kV2c*+ Meter Equipped with Trilliant Networks CellReader™ Communications Module

Exhibit 34.

The kV2c+ with CellReader Communications Module uses digital cellular technology to provide public radio frequency (RF) communications coupled with the best available and most cost effective wireless coverage in the US and Canada. It features both scheduled reads and on-demand reads via a wireless two-way communications network and has both packet data transmission capabilities (faster and more reliable than traditional transmission modes) as well as circuit-switched data communications (traditional dial-up modem). The CellReader module can operate on any public GSM network, such as those operated by Rogers Wireless, T-Mobile and AT&T Wireless.

Exhibit 34.

GE Energy's kV2c+ meter with integrated CellReader Communications Module from Trilliant Networks uses digital cellular technology to make all meter information available any time, anywhere. This solution is ideal for commercial and industrial meter applications that need an upgrade path from analog cellular and telephone line solutions to a digital cellular solution. This solution is

	also well suited for hard-to-read, load research, power quality applications, and demand response applications. Exhibit 34. *GE Energy's I-210TM Singlephase Meter with integrated Itron® 52ESS ERT® is an electronic watthour meter designed for measuring and communicating energy consumption in singlephase services to Itron reading systems. By developing a single board that contains the metering and the ERT functionality, GE Energy continues its strong tradition of reliability and affordability.* Exhibit 35. I-210+ Equipped with DCSI's UMT-R Endpoint Exhibit 36. *GE Energy's I-210+ with integrated DCSI UMT-R (Universal Meter Transponder—Residential) provides remote two-way access to consumption and voltage data contained in the meter through the TWACS® fixed network power line communication system. This combined solution brings significant value to the marketplace.* Exhibit 36.

	I-210+ equipped with Silver Spring Networks NIC Exhibit 37. *GE Energy's I-210+ meter with integrated Silver Spring Networks (SSN) Network Interface Card (NIC) combines the accuracy and flexibility of our latest single-phase metering platform with the power and flexibility of SSN's two-way Smart Energy Network. This GE/SSN I-210+ meter brings significant value to the market- place for today and into the future.* Exhibit 37. kV2c/kV2c+ Meter Equipped with Itron® 53ESS ERT® Exhibit 38.

GE Energy

kV2c/kV2c+ Meter
Equipped with Itron® 53ESS ERT®

Utilities can maximize the level of service they provide to residential and industrial customers using automatic meter reading (AMR) solutions. GE Energy offers the kV2c/kV2c+ meter, equipped with the Itron 53ESS ERT, as a solution for commercial and industrial applications. This AMR solution allows utilities to collect not only consumption data from demand or time-of-use metered accounts, but billing data as well. An Itron 53ESS ERT installed "under the cover" of a kV2c/kV2c+ retrieves the billing data directly from the meter.

Exhibit 38.

kV2c* Meter Equipped with the Silver Spring Networks PowerPoint® Network Interface Module

Exhibit 39.

About the Silver Spring Networks' kV2c PowerPoint® Network Interface Module

- Full two-way, 900MHz, spread spectrum communications
- Powerful radio communications – Full one watt of output power
- Reads metrology data directly from meter register
- Serves as a signal relay for other network devices (such as water, gas, or other electric meters)
- Robust AMR capabilities – easy to program, large breadth of transmitted parameters, remote demand reset capabilities

Exhibit 39.

IEC Smart Meters

Residential Smart Meters

SGM3000 Series (http://www.aclara.com/products/ice-smart-meters/sgm-3000/)
The SGM3000 series of single phase and polyphase IEC Smart Energy Meters provides reliable and robust metering solutions for utilities and their customers for residential and commercial applications. Available in single phase and three phase models, the SGM3000 series offers advanced, comprehensive, and flexible technologies to cover applications ranging from basic, energy-only metering to smart metering with advanced communications and demand management. Learn More. (http://www.aclara.com/products/ice-smart-meters/sgm-3000/)

Exhibit 10.

SGM1300 Dual Element Smart Energy Meter (http://www.aclara.com/products/ice-smart-meters/sgm1300/)
Aclara Meters' SGM1300 is an advanced, modular, single phase and dual element smart meter suitable for both residential and small commercial environments. With advanced communications, the SGM1300 offers two way communications between the meter and the utility's nominated Head End System and includes support for a ZigBee Home Area Network enabling communications with devices such as gas meters and consumer In Home Displays for real time energy monitoring. Learn More. (http://www.aclara.com/products/ice-smart-meters/sgm1300/)

Exhibit 10.

SGM1100 Smart Energy Meter (http://www.aclara.com/products/ice-smart-meters/test/)
SGM1100 Series are single phase smart energy meters compliant with IEC regulatory standards. Delivering high quality, functionality, and application flexibility, this series also provides PLC AMI communications based on PoweRline Intelligent Metering Evolution (PRIME) standard and DLMS/COSEM protocols. Learn More. (http://www.aclara.com/products/ice-smart-meters/test/)

Exhibit 10.

Commercial Smart Meters

SGM3000 Series (http://www.aclara.com/products/ice-smart-meters/sgm3000/)
The SGM3000 series of commercial and industrial meters moves beyond revenue metering to real-time instrumentation, true power quality monitoring and real cost of service measurements. From simple energy rating to quality of service and load analysis, the SGM3000 series can be configured to meet all your high precision smart metering needs. Learn More. (http://www.aclara.com/products/ice-smart-meters/sgm3000/)

Exhibit 10.

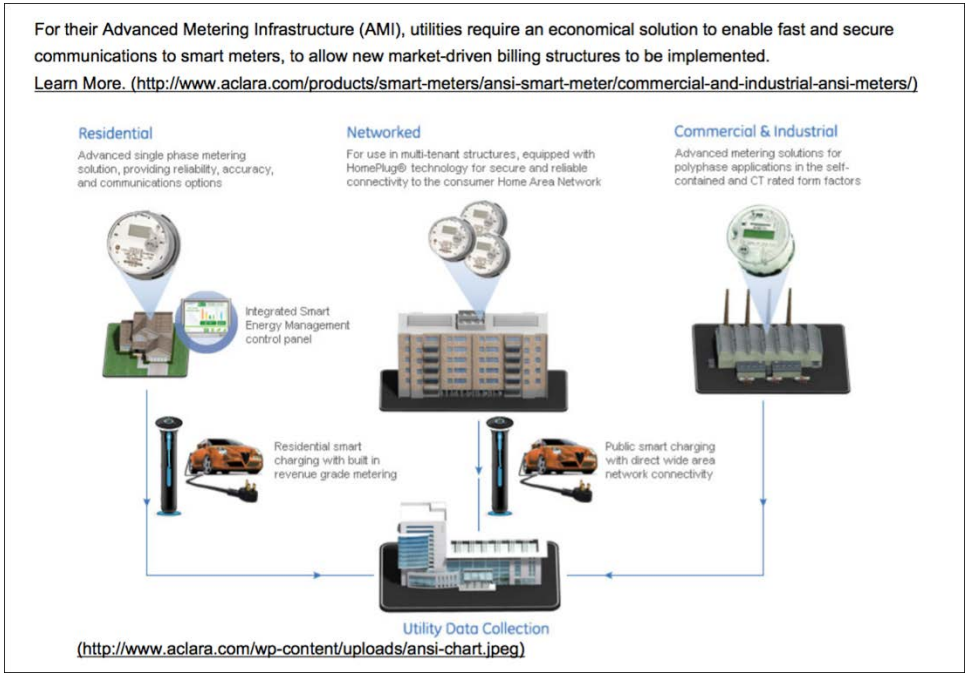


Exhibit 9.

SMOS (Smart Metering Operations Suite) provides visibility to data retrieved from network management services, a network of Access Points and devices. SMOS also provides the back-office integration functions that deliver data from across the network to core operational systems, such as Outage Management Systems and other

applications. SMOS supports various industry standard interfaces and protocols.

Exhibit 1.

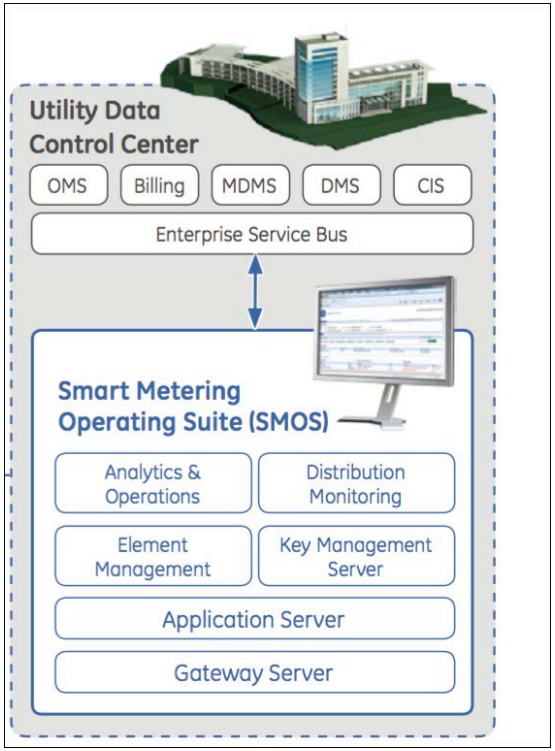
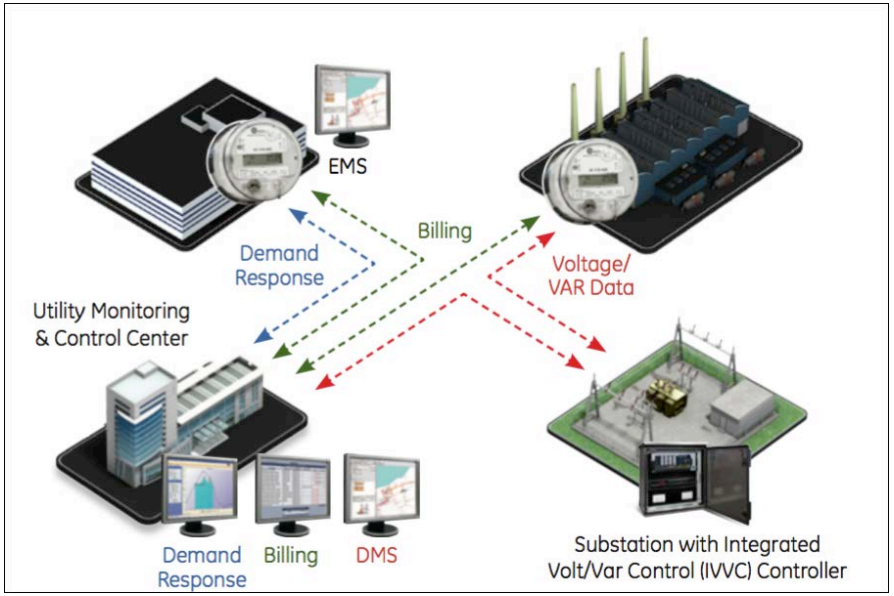


Exhibit 1.

The Grid IQ AMI P2MP solution is more than the just a wireless communication link, it is a metro scale, end-to-end wireless solution containing:

- Wireless modules (endpoints) that are used for simple and standardized integration with the endpoint devices.
- Access Points (APs), which are mounted on mountain tops, pole tops, towers, rooftops, and other elevated sites, providing field installed network infrastructure.
- SMOS data management services including endpoint data management, seamless integration into back-office systems and publication of network management status and alarms related to network components.
- Security Key Management Server (KMS), which is responsible for providing end-to-end security features.

Exhibit 1.



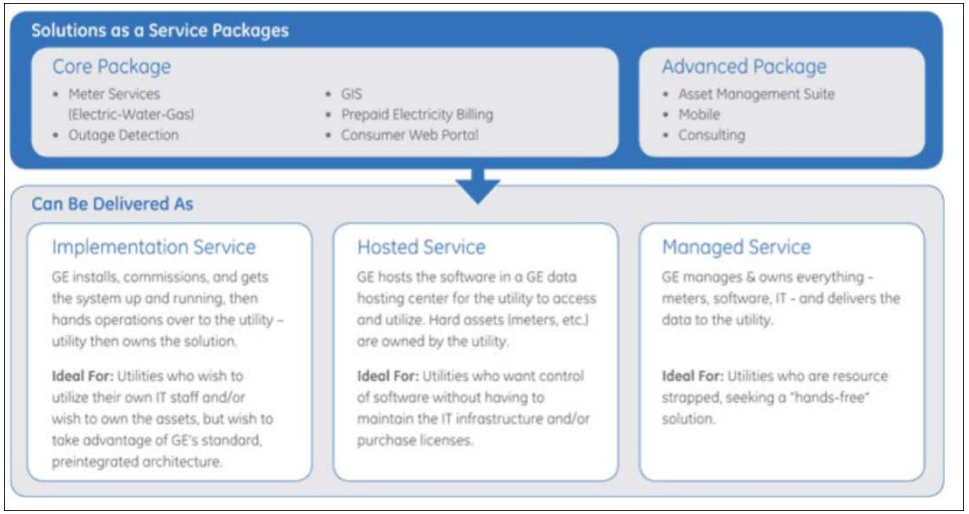


Exhibit 2.

GE's Grid IQ™ Connect SaaS Awarded Best Smart Grid Solution by Municipal Utility Customers

- *GE's Solution as a Service Offering Helps Modernize Utilities' Electrical Grids*
- *Grid IQ SaaS included in GE's Portfolio of Advanced Industrial Internet Solutions*

Exhibit 4.

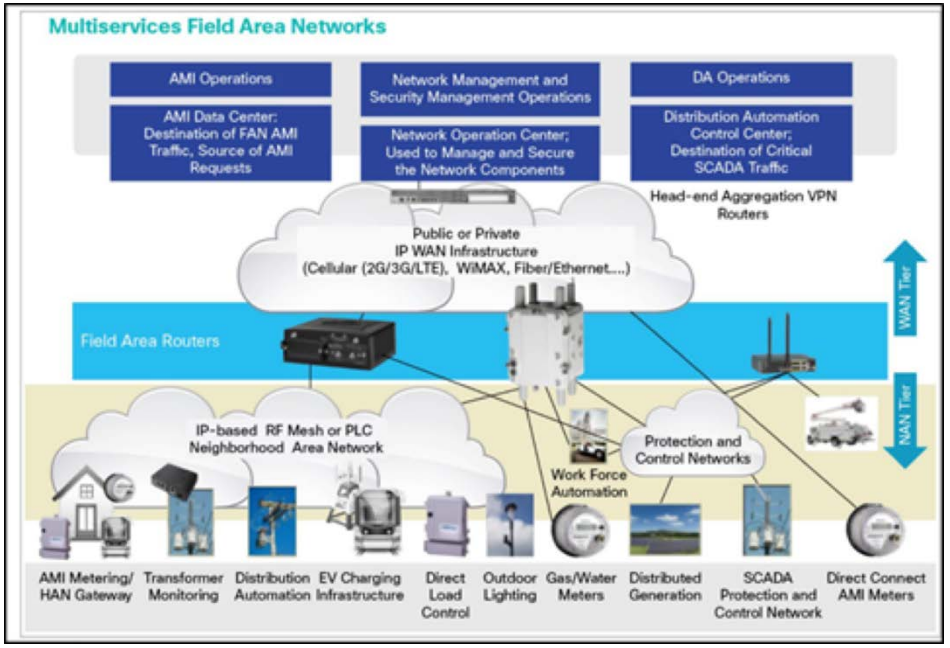


Exhibit 64.

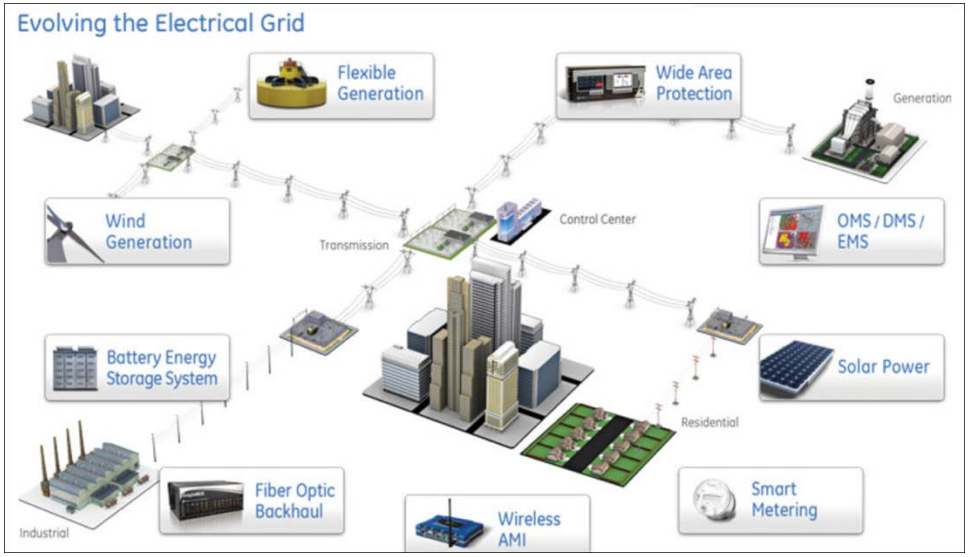
Grid IQ Connect is a services-based program offered by GE's Solution as a Service business. It offers customers incredible value from accelerated benefits due to the speed at which the system is deployed, technology risk mitigation and by providing smaller utilities access to technology otherwise not affordable in traditional project delivery models. The offering consists of five primary services to enhance the effectiveness of advanced meter infrastructure systems and other aspects of grid operations. These services include meter data services, pre-payment services, outage detection and notification

	services, asset monitoring services and consumer portal services. Exhibit 4. *GE's SaaS offerings are available via three levels of delivery modes—total managed services, software as a service and deployment at the customer site. Additionally, its advanced application solutions provide municipal utilities with comprehensive outage management (Grid IQ Restore) and demand response capabilities (Grid IQ Respond). Currently, Grid IQ Connect is being utilized by Electric Cities of Georgia, the city of Norcross, Ga., and the city of Leesburg, Fla.* Exhibit 4. *"Here's General Electric's smart grid-as-a-service pitch. The city utility of Norcross, Ga. wants a smart grid, but doesn't have the money to buy one for itself. GE's Grid IQ Solutions as a Service will build it for a monthly fee, and then run it all from a giant cloud computing platform in Atlanta."* Exhibit 29. *"General Electric has been slow to announce new customers for the smart-grid-as-a-service offering it*

	launched in late 2011. But that doesn't mean it's not filling up its dance card with small municipal and rural cooperative utilities interested in a subscription-based smart grid -- or that the market for this kind of novel deployment may not be nearing an inflection point. Exhibit 30. *"In the past three months, GE has named the municipal utilities of Holly Spring, Miss. and Skiatook, Okla. as customers, adding their names to those of flagship customers Norcross, Ga. and Leesburg, Fla. Three or four more customers are using the service, another three or four signed up in the fourth quarter of 2013, and an additional three are expected to sign up in the near future,"* Exhibit 30. *"Grid IQ Connect is a services-based program offered by GE's Solution as a Service (SaaS) business. It offers customers incredible value from accelerated benefits due to the speed at which the system is deployed, technology risk mitigation and by providing smaller utilities access to technology otherwise not affordable in traditional project delivery models. The offering consists of five primary services to enhance the effectiveness of advanced meter*

	infrastructure systems and other aspects of grid operations. These services include meter data services, pre-payment services, outage detection and notification services, asset monitoring services and consumer portal services." Exhibit 31. *GE's SaaS offerings are available via three levels of delivery modes-total managed services, software as a service and deployment at the customer site. Additionally, its advanced application solutions provide municipal utilities with comprehensive outage management (Grid IQ Restore) and demand response capabilities (Grid IQ Respond). Currently, Grid IQ Connect is being utilized by Electric Cities of Georgia, the city of Norcross, Ga., and the city of Leesburg, Fla.* Exhibit 31. *"Advancements in digital technology have led to an increased demand on electrical grids worldwide," said Craig Mims, utilities director for the city of Norcross. "Implementing GE's Grid IQ Connect technology has helped modernize our grid and provide our customers with more efficient and reliable electricity."* Exhibit 31.

	Advanced grid management technologies, such as Grid IQ Respond and Grid IQ Restore, enable municipal utilities to deploy smart grid technology faster, allowing customers to realize all of the benefits associated with implementing these advanced systems in a much shorter time span. Not only does Grid IQ Connect reduce technology risks and software costs to municipal utilities by using a SaaS-hosted model, it also provides a choice of capital expenditure and operational expense pricing options to fit the individual needs of each customer. Exhibit 31. *In addition, Grid IQ Connect provides utilities with a means to improve operations and customer services while also improving customer engagement and account management. The technology helps reduce the duration of system outages and lower municipal utility operating costs.* Exhibit 31.

	 Exhibit 26.

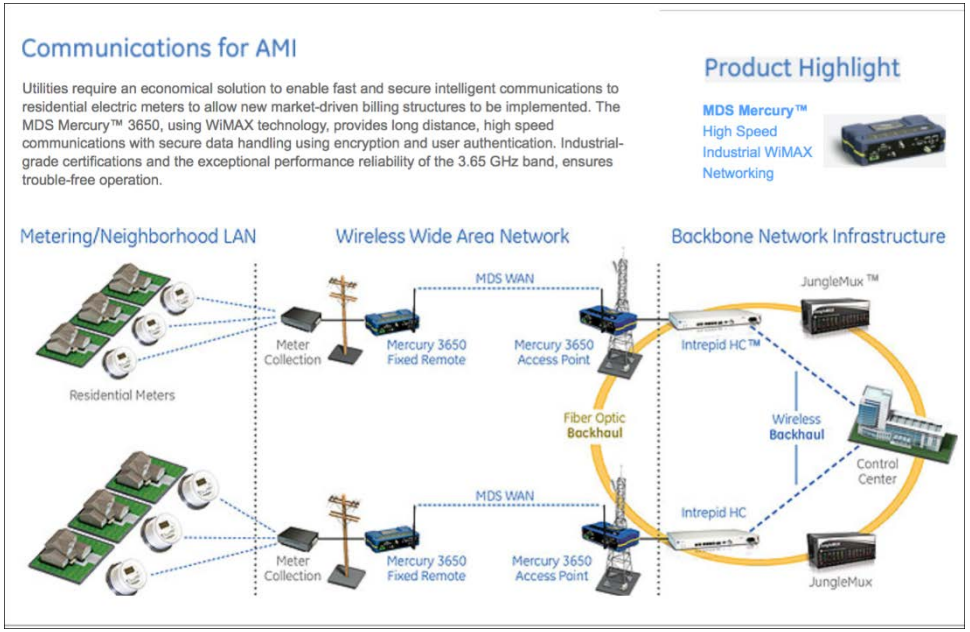

Communications for AMI
Utilities require an economical solution to enable fast and secure intelligent communications to residential electric meters to allow new market-driven billing structures to be implemented. The MDS Mercury™ 3650, using WiMAX technology, provides long distance, high speed communications with secure data handling using encryption and user authentication. Industrial-grade certifications and the exceptional performance reliability of the 3.65 GHz band, ensures trouble-free operation.
Product Highlight
MDS Mercury™
High Speed
Industrial WiMAX
Networking
Metering/Neighborhood LAN
Wireless Wide Area Network
Backbone Network Infrastructure
MDS WAN
JungleMux ™
Meter Collection
Mercury 3650 Fixed Remote
Mercury 3650 Access Point
Intrepid HC™
Residential Meters
Fiber Optic Backhaul
Wireless Backhaul
Control Center
MDS WAN
Intrepid HC
Meter Collection
Mercury 3650 Fixed Remote
Mercury 3650 Access Point
JungleMux

Exhibit 27.

Exhibit 28.

Grid IQ AMI systems include or access one or more wireless networks. GE communicates with (e.g., alerts) endpoints using various technologies including but not limited to: RF Mesh, Cellular, Power Line Carrier, RS-232, RS-485, and Analog Phone Modems. (See e.g., Exhibit 25). To the extent these and analogous technologies include wireless components (e.g., routers, transmitters, receivers, transceivers, repeaters), they are part of an accused wireless network.

Components of the Grid IQ Network Communications Platform include industrially hardened fiber and wireless communications that stretch from the network edge to the back office, a network management solution that provides advanced management of the entire network, and standards based cyber security surrounding the entire system.

Exhibit 14

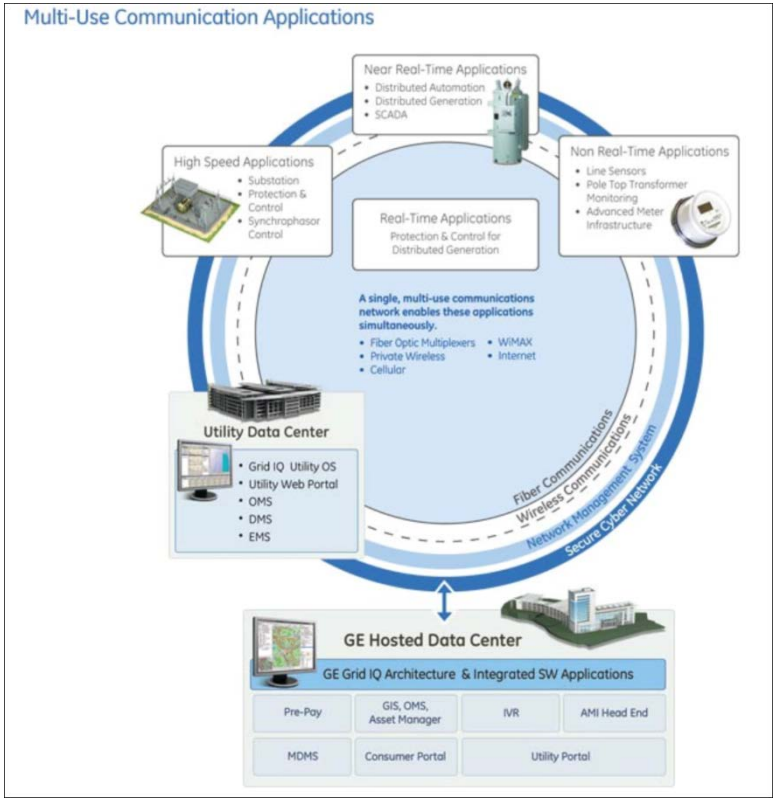
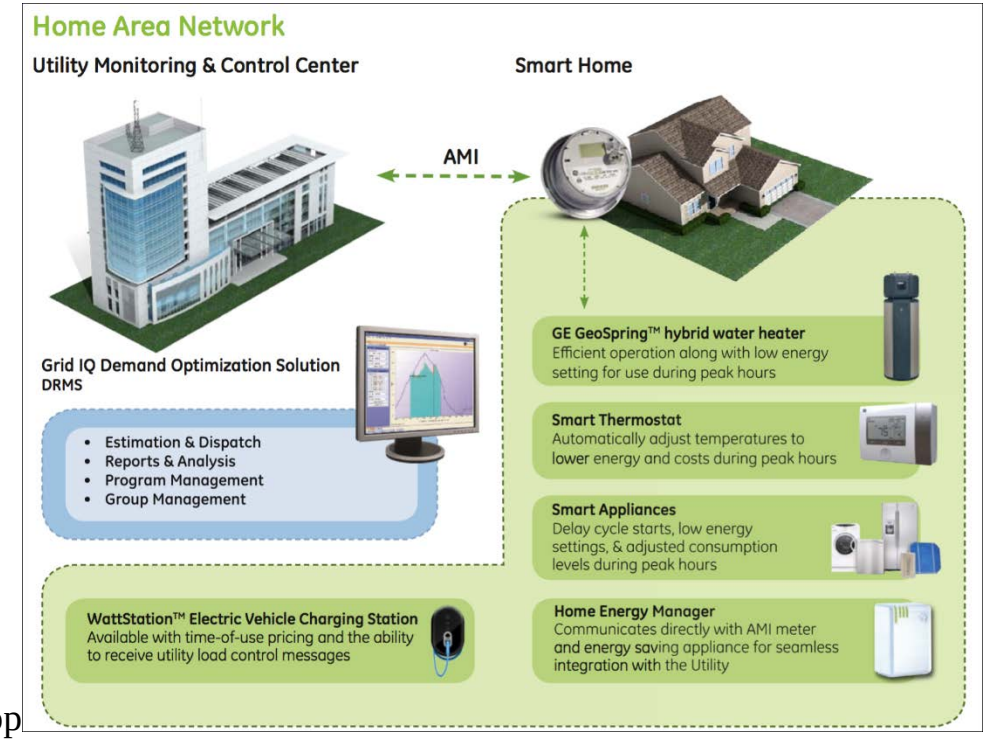

Multi-Use Communication Applications
Near Real-Time Applications
Distributed Automation
Distributed Generation
SCADA
High Speed Applications
Substation
Protection & Control
Synchrophasor Control
Non Real-Time Applications
Line Sensors
Pole Top Transformer Monitoring
Advanced Meter Infrastructure
Real-Time Applications
Protection & Control for Distributed Generation
A single, multi-use communications network enables these applications simultaneously.
Fiber Optic Multiplexers
Private Wireless
Cellular
WiMAX
Internet
Utility Data Center
Grid IQ Utility OS
Utility Web Portal
OMS
DMS
EMS
Fiber Communications
Wireless Communications
Network Management System
Secure Cyber Network
GE Hosted Data Center
GE Grid IQ Architecture & Integrated SW Applications
Pre-Pay
GIS, OMS, Asset Manager
IVR
AMI Head End
MDMS
Consumer Portal
Utility Portal

Exhibit 5.



op

Exhibit 12.

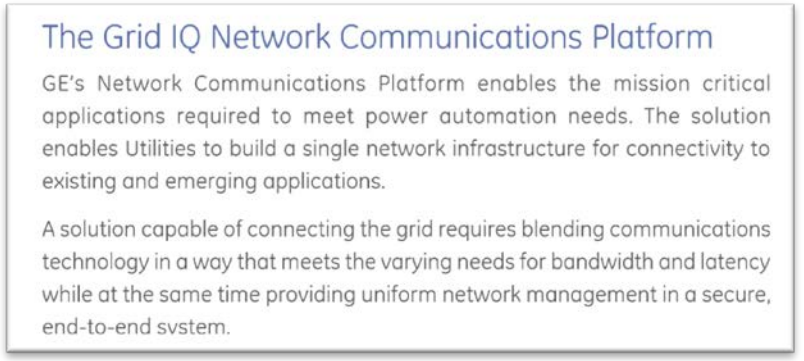


Exhibit 14

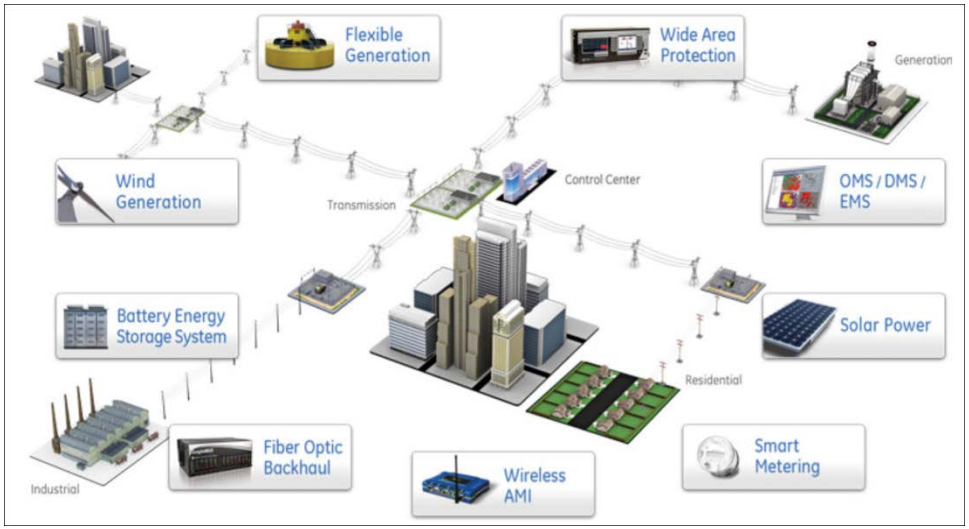


Exhibit 26.

Whether deployed in large metropolitan areas, sparse rural areas or in between, the Grid IQ AMI P2MP Solution provides Utilities with thousands of square miles of robust, reliable wireless coverage, with minimal network infrastructure. In addition, the solution has the ability to service multiple applications including Smart Metering, Distribution Monitoring, battery-powered applications requiring long life, as well as below ground and in-building assets.

Exhibit 1.

RF Mesh offers a cost performance that is best deployed in dense suburban environments. As urban densities increase and suburban densities decrease, the total cost per meter increases drastically for an RF Mesh enabled meter. This is because the network requires the addition of multiple routers and collectors to relay signals through the neighborhood area network as densities decrease.

Exhibit 1.

The Grid IQ AMI P2MP Solution is a Point-to-Multipoint or RF "Star" architecture with numerous coverage and throughput benefits ideal for the RF propagation environments from rural to urban. Further, the Network is more than an AMI solution. It is built to support various Grid Modernization applications beyond Smart Metering.

Exhibit 1.

The Grid IQ AMI P2MP solution is more than the just a wireless communication link, it is a metro scale, end-to-end wireless solution containing:

- Wireless modules (endpoints) that are used for simple and standardized integration with the endpoint devices.
- Access Points (APs), which are mounted on mountain tops, pole tops, towers, rooftops, and other elevated sites, providing field installed network infrastructure.
- SMOS data management services including endpoint data management, seamless integration into back-office systems and publication of network management status and alarms related to network components.
- Security Key Management Server (KMS), which is responsible for providing end-to-end security features.

Exhibit 1.

The Grid IQ Network Communications Platform

GE's Network Communications Platform enables the mission critical applications required to meet power automation needs. The solution enables Utilities to build a single network infrastructure for connectivity to existing and emerging applications.

A solution capable of connecting the grid requires blending communications technology in a way that meets the varying needs for bandwidth and latency while at the same time providing uniform network management in a secure, end-to-end system.

Exhibit 5.

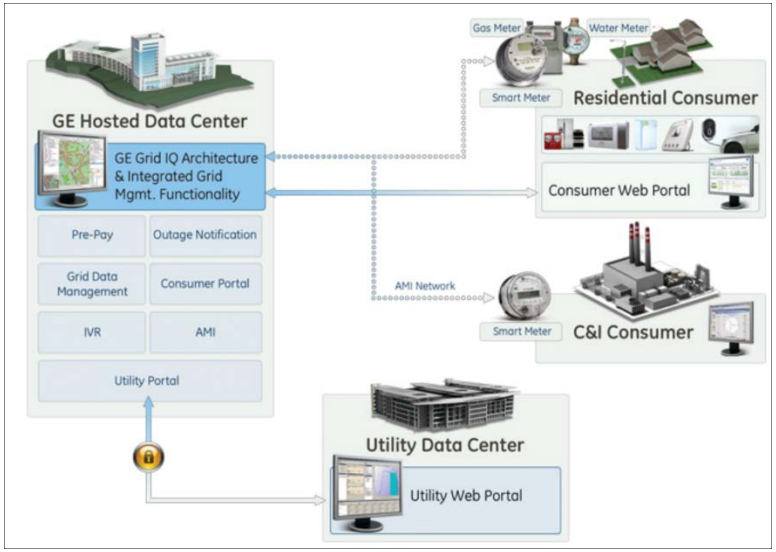


Exhibit 2.

- AMR/AMI Plug and Play designed to accommodate: RF, PLC, Cellular (GPRS/CDMA), Ethernet (See attached table for currently offered factory integrated solutions)
- Complete range of S-base and A-base forms
- 4-quadrant industrial or substation measures
- Powerful functional upgrades provide 4-channel 64 kb, 20-channel 192 kB, or 20-channel 384 kB recording for voltage, current, energy, apparent power, reactive power, distortion power, power factor, THD, TDD, DPF.
- Per phase AC instrumentation (amps, volts, and frequency)

Exhibit 63.

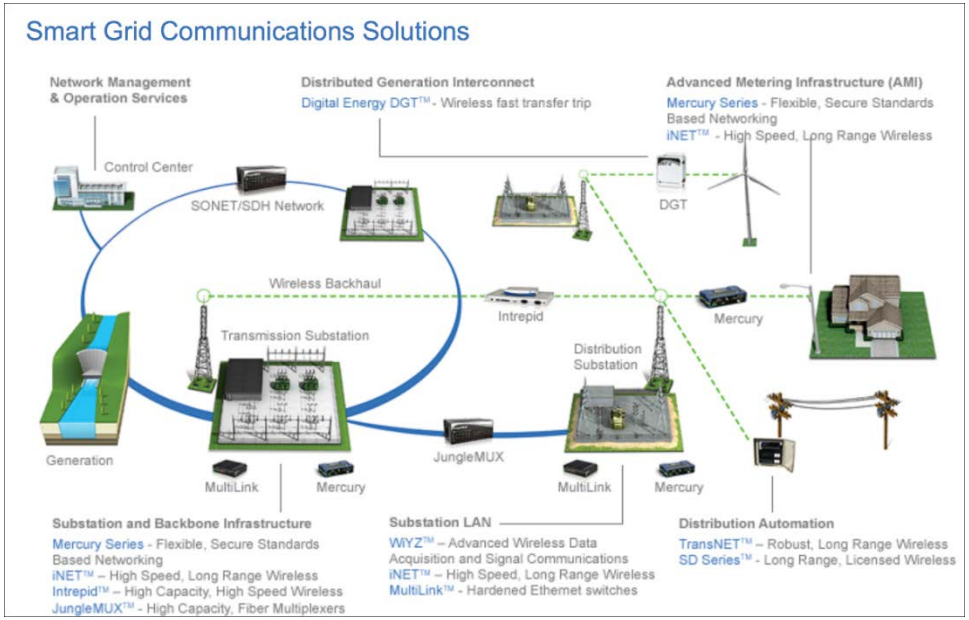


Exhibit 6.

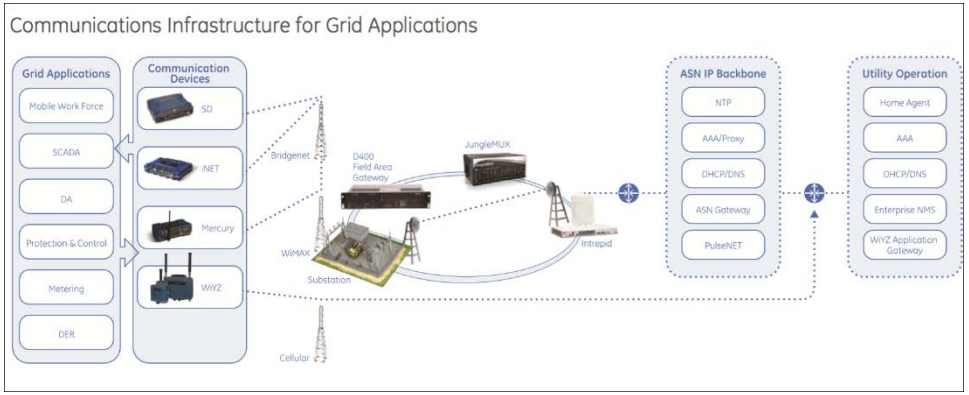


Exhibit 13.

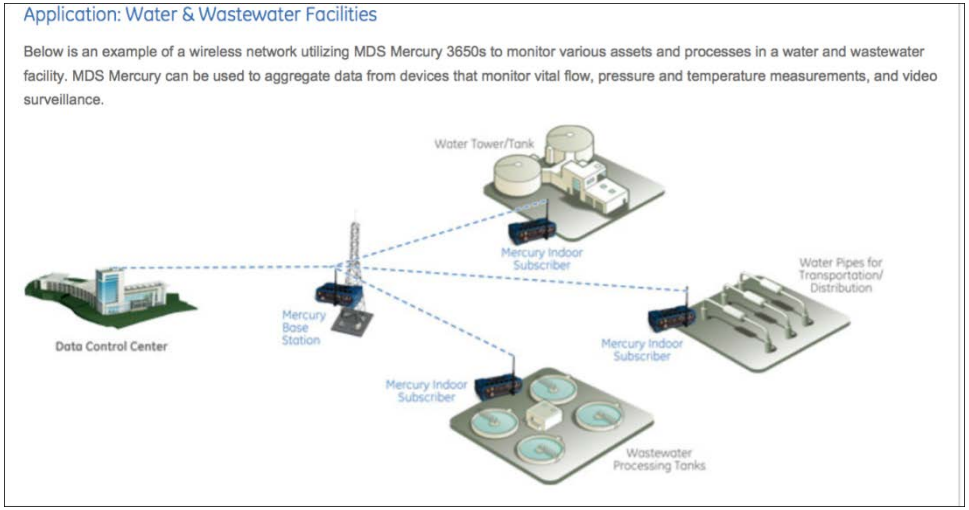


Exhibit 21.

Aclara Meters' most advanced residential electricity metering product line, the I- 210+c, delivers smart grid capability for today and the future. This residential meter

was derived from our commercial and industrial product line, taking our advanced metrology capability learned over 10 years of solid state metering design. This meter contains the advanced polyphase functionality that Aclara Meters has been known for.

Exhibit 23.

AMI TECHNOLOGIES	TYPE	I-210+	I-210+c
Aclara UMT-R	PLC	X	
Ingenu RPMA	RF P2MP	X	X
Itron 54ESS ERT, 55ESS ERT, 56ESS ERT	1-way RF AMR	X	
Itron 57ESS ERT	1-way RF AMR		X
Itron Cellular EVDO & HSPA	Cellular Network		X
Sensus FlexNet	RF P2MP		X
Silver Springs Networks NIC 310	RF Mesh	X	
Silver Springs Networks NIC 410	RF Mesh		X
Silver Springs Networks MicroAP	Cellular & RF Mesh		X
Trilliant SecureMesh	RF Mesh	X	X

Exhibit 23.

Below is an example of a Smart Grid Advanced Metering Infrastructure (AMI) private wireless network utilizing MDS Mercury 3650s.

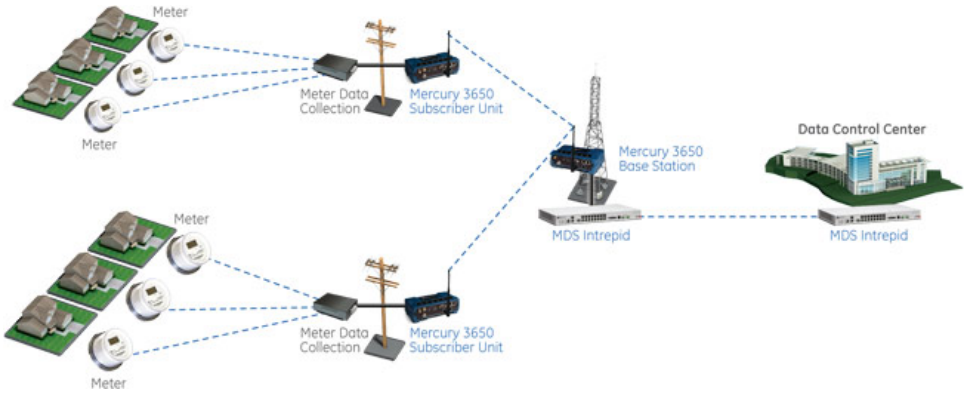


Exhibit 21

Outdoor Subscriber Unit - ODU

The MDS Mercury radios are equipped with an embedded spectrum analyzer to assist in deployment and troubleshooting.

- 2 x 23 dBm
- 1 Ethernet port, 1 serial port, 1 USB host
- Optional built-in WiFi
- Integrated antenna
- Power over Ethernet (PoE)
- 10-60 VDC option
- MIMO matrix A/B
- -40° C to +70° C
- IEEE 1613 compliant
- General Safety by CSA / UL 60950

Exhibit 22.

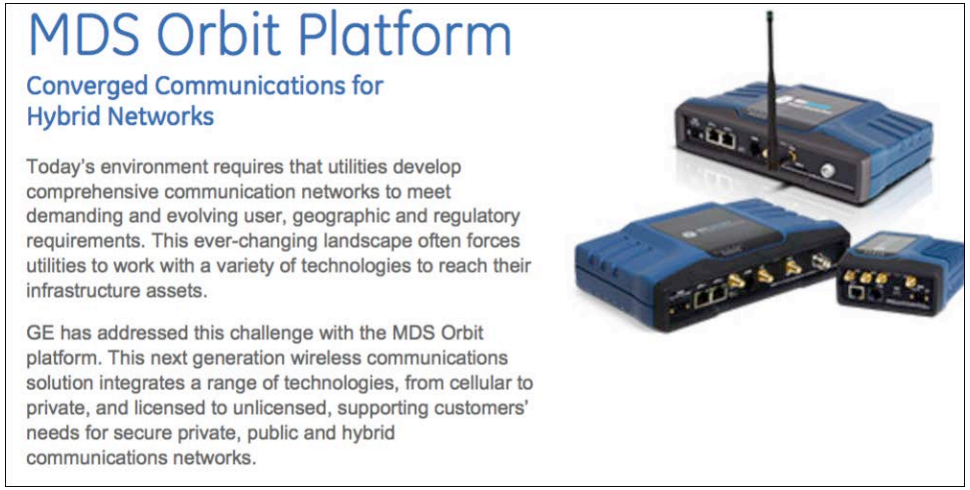


Exhibit 17.

Exhibit 17.

MDS NETio - Analog and Digital I/O Signal

The unlicensed MDS NETio family provides flexible I/O signal communication solutions on two levels. Protocol addressable I/O allows direct communication with remote I/O accommodating IP/Ethernet and serial protocols, without the need for a PLC or RTU. I/O extension allows regeneration signals between remote I/O points and monitoring/control devices, providing location-specific distance and point count requirements.

More Info Buy Now

Exhibit 18.

MDS entraNET - Extended Range IP/Ethernet and Serial Networking

The MDS entraNET is an exceptionally long range, unlicensed device offering robust performance in extreme environmental conditions. Sleep modes keep power consumption low for battery and solar applications. Both Ethernet and serial devices can communicate in peer-to-peer mode and connect to an IP network—all with multiple layers of cyber-security. The end result is reduced cost of deployment and a low cost of ownership for systems that bring mission-critical, revenue-generating data from assets dispersed over great distances.

Exhibit 18.

MDS Intrepid Unlicensed Solutions – Long Distance, High Capacity

The MDS Intrepid products offer long distance, high capacity, point-to-point solutions that operate in the 2.4 and 5 GHz bands. The Intrepid is ideal for high capacity mission-critical communications such as backhaul.

Point-to-Point 2.4, 5.4, 5.8 GHz Unlicensed
Point-to-Multipoint 5.4 and 5.8 GHz Unlicensed

Exhibit 18.

MDS Mercury 3650 – Flexible, Secure Standards Based Networking

The MDS Mercury Series is a highly secure, industrial-grade WiMAX communications platform for mission critical, industrial applications. The Mercury product line provides a global licensed and unlicensed solution designed to facilitate high throughput wireless networking requirements in the 3650MHz frequency band.

More Info Buy Now

Exhibit 18.

Exhibit 18.

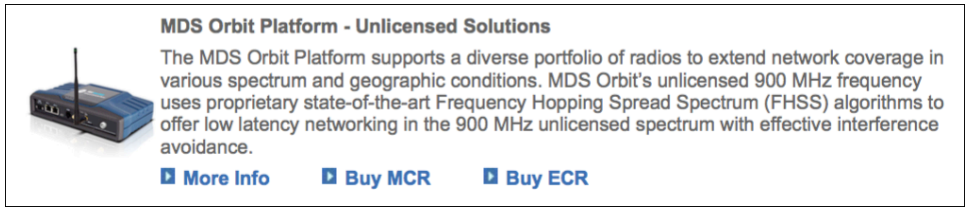


Exhibit 18.

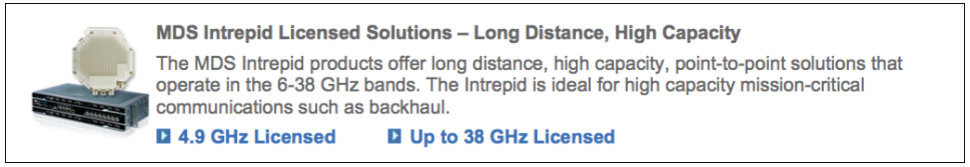


Exhibit 19.

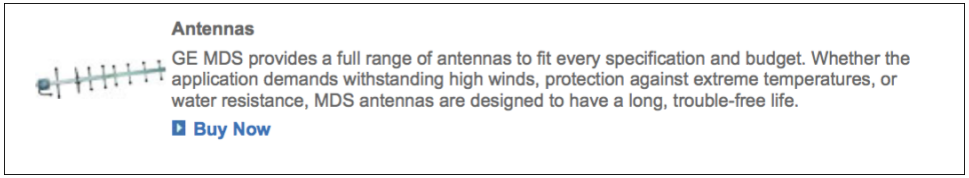


Exhibit 20.

Accessories

MDS Accessories are hand-picked and tested to ensure optimal performance under even the most extreme conditions. We provide a complete line of reliable and cost-effective accessories that are fully tested to perform at optimal levels. We simplify wireless system design by providing a convenient single source for ordering.

RF Kits

The MDS RF Kits provide an easy-to-order wireless package. These kits include everything needed in typical applications, including wireless devices, antennas, cables, connectors, grounding, lightening arrestors, and power supplies.

Buy Now

Exhibit 20.

MDS Mercury 3650 – Flexible, Secure Standards Based Networking

The MDS Mercury Series is a highly secure, industrial-grade WiMAX communications platform for mission critical, industrial applications. The Mercury product line provides a global licensed and unlicensed solution designed to facilitate high throughput wireless networking requirements in the 3650MHz frequency band.

More Info Buy Now

Exhibit 19.

MDS SD Series - Long Range IP/Ethernet and Serial

The MDS SD Series supports 200MHz, 400MHz and 900 MHz licensed frequency and features a software-defined modem and an optimized hardware platform supporting both IP/Ethernet and serial communications. SD products are ideal for customers using dedicated frequencies for long range communications to PLCs. These telemetry solutions are optimized with low power and sleep mode features for battery and solar applications.

More Info Buy Now

Exhibit 19.

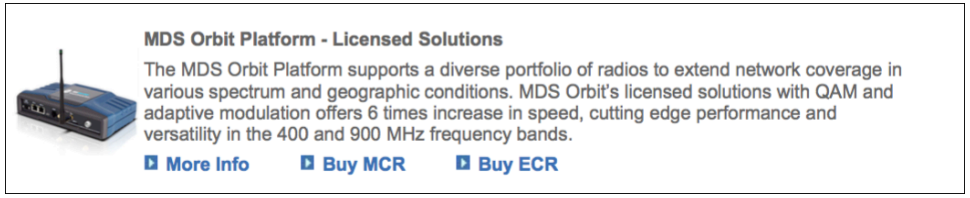


Exhibit 19.

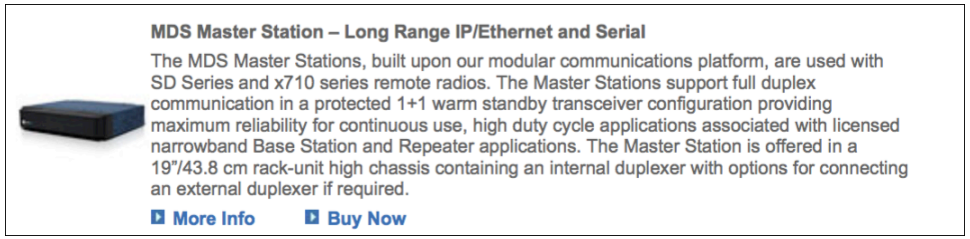
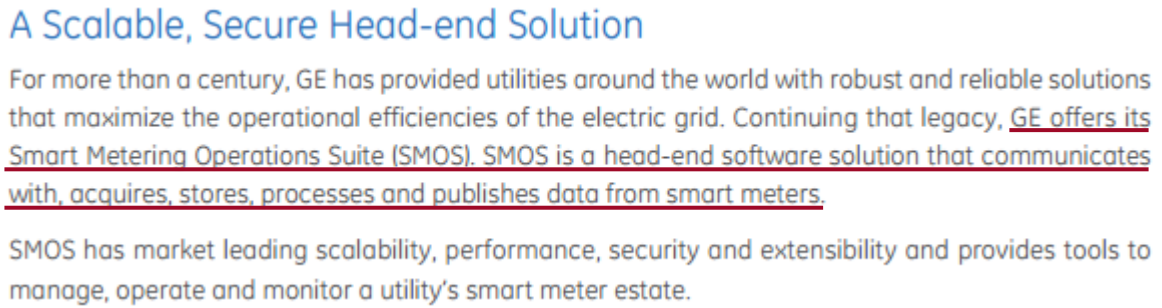


Exhibit 19.



GE Digital Energy, *SMOS Smart Metering Operations Suite*, GEA-12699C(E) (2014) *available at*: https://www.gedigitalenergy.com/products/brochures/SmartMetering/SmartMeterOperationsSuite.pdf

	• Supports a broad range of communication technologies including 2G (GPRS), 3G, 4G, wireless PTMP (2.4 GHz). • Supports GE Meters: - IEC Smart Electric Meters (SGM3000™, SGM1300™ and SGM1000™ platforms) - IEC Smart Gas Meter G4 ZV - ANSI Smart Electric Meters (I-210 and KV2c platforms) GE Digital Energy, *SMOS Smart Metering Operations Suite*, GEA-12699C(E) (2014) *available at*: https://www.gedigitalenergy.com/products/brochures/SmartMetering/SmartMeterOperationsSuite.pdf Each of the endpoint recipients in the group of Grid IQ endpoint recipients alerted in the claimed method comprise a mobile device capable of transmitting and receiving data. In the Grid IQ Smart Metering System Accused Instrumentalities, endpoint recipients are two-way nodes on the network (e.g., the smart grid nodes that include ERTs or MIUs, DA devices, etc.). Mobile modules transmit and receive data. Alerting groups of recipients includes communication related to on-demand readings, remote disconnects/reconnects, demand-response, load shedding, and OTA updates. **Software, hardware, interfaces, and systems used for alerting groups of recipients are Accused Instrumentalities.**

	Meters used in Grid IQ systems and the components (software, hardware, etc.) used to program the meters and enable the meters for two-way wireless communication are Accused Instrumentalities. Exemplary meters are listed below by model number to the extent known.

I-210+ equipped with SSN's NIC - GE Energy's I-210+ meter with integrated Silver Spring Networks (SSN) Network Interface Card (NIC) combines the accuracy and flexibility of our latest single-phase metering platform with the power and flexibility of SSN's two-way Smart Energy Network.
Fact Sheet

Exhibit 44.

I-210+ equipped with UMT-R - GE Energy's I-210+ with integrated DCSI UMT-R (Universal Meter Transponder-Residential) provides remote two-way access to consumption and voltage data contained in the meter through the TWACS® fixed network power line communication system.
Fact Sheet

Exhibit 44.

I-210 equipped with DCSI's EMT-3G - under the meter cover as a personality module to the I-210 meter and monitors power consumption using a pulse-initiator output signal from the I-210. Customers who have TWACS(R) two-way power line communications system can now take advantage of the new I-210 without having to invest in additional communication infrastructure.
Fact Sheet

Exhibit 44.

I-210 equipped with Hunt TS1 - The I-210 TS1 Endpoint Transmitter is designed to provide internal AMR capability to GE Energy's I-210 singlephase electronic residential meter. It is installed under the cover and monitors power consumption using the energy pulse signal from the I-210 meter. With this solution, customers who have Hunt Technologies' TS1 power line communications system can now take advantage of the I-210.
Fact Sheet

Exhibit 44.

I-210

I-210 equipped with Itron 52ESS ERT - This product features the I-210 meter integrated with the Itron 52ESs ERT module. It is designed for measuring and communicating energy consumption in singlephase services to Itron reading systems.
Fact Sheet

Exhibit 44.

kV2c+ equipped with Trilliant Networks CellReader-GSM - GE Energy's kV2c+ meter with an integrated CellReader Communications Module from Trilliant Networks uses digital cellular technology to make all meter information available anytime, anywhere. The CellReader module can operate on any public GSM network, such as those operated by Rogers Wireless, T-Mobile and AT&T Wireless.
Fact Sheet

Exhibit 44.

	kV2c+ equipped with Trilliant Networks CellReader-CDMA - GE Energy's kV2c+ meter with an integrated CellReader Communications Module from Trilliant Networks uses digital cellular technology to make all meter information available anytime, anywhere. The CellReader module can operate on any public CDMA network, such as Verizon Wireless, Bell Mobility, Telus Mobility, and Sprint PCS. Fact Sheet Exhibit 44. **kV2c equipped with SSN PowerPoint** - This solution combines the power and flexibility of the kV2c meter with the 2-way wireless networking AMR capability offered by Silver Spring Networks. This is an under-the-cover solution where all metrology calculations are performed by the kV2c meter. Fact Sheet Exhibit 44. **kV2c equipped with UtiliNet** - GE Energy's kV2c with integrated Cellnet UtiliNet® endpoint combines the accuracy and robustness of our electronic polyphase meter with the power and flexibility of Cellnet's UtiliNet two-way network. Fact Sheet Exhibit 44.

kV2c/kV2c+ equipped with Itron 53ESS ERT - This product was specifically designed to add internal Itron ERT functionality to the kV2c and kV2c+ meters. The 53ESS ERT reads the resulting parameters directly from the internal meter register and transmits this data back to the Itron meter reading software via three Standard Consumption Messages.
Fact Sheet

Exhibit 44.

kV2c equipped with Hunt TS2 - With this product, customers who have Hunt Technologies' TS2 bi-directional power line carrier (PLC) system can take advantage of the flexibility that the kV2c meter offers, without having to invest in additional communication infrastructure. This is an under-the-cover, direct register read solution.
Fact Sheet

Exhibit 44.

kV2c equipped with Hunt TS1 DRR Endpoint Transmitter - This solution is designed to provide internal, under-the-cover AMR capability to GE's family of polyphase commercial and industrial meters. Customers that have Hunt Technologies' TS1 power line carrier (PLC) AMR system can take advantage of the flexibility that the kV2c meter offers, without having to invest in additional communication infrastructure. A self-contained 480V solution is also available.
Fact Sheet

Exhibit 44.

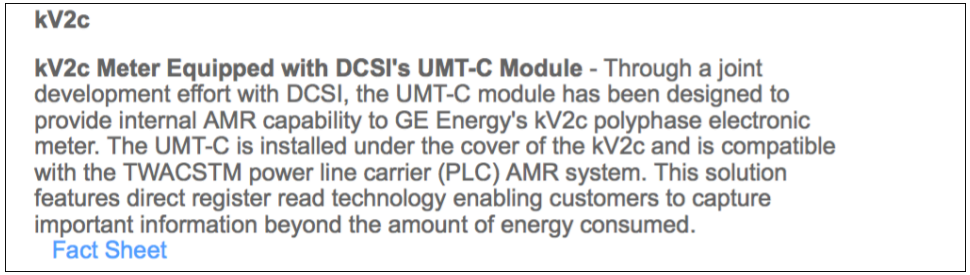


Exhibit 44.

GE communication modules comprise mobile transceivers and are Accused Instrumentalities:

GE Smart Metering System endpoints (including smart meters, DA nodes, and home gateway devices) comprise a mobile device capable of transmitting and receiving data.

GE's I-210 or SGM3000 Meter and Meter Communications Module

The Electric MCM is integrated with both the I-210 ANSI and SGM3000 IEC Family of meters and provides:

- Up to fifteen minute intervals and daily register reads provided every fifteen minutes over the network, including precise event correlation across reads.
- Two-way meter communication to support on demand functionality, meter configuration, and remote meter disconnect.
- Last gasp meter reporting for power outage.
- Over the air updates of endpoint firmware.

Exhibit 8

Remote "Endpoint" devices, such as utility smart meters or fault indicators, communicate directly with the "Access Points" deployed either on towers or utility poles allowing for flexible low cost deployments. An Endpoint a is device containing a small RF module designed for easy integration and ultra-low power operation in Smart Meters or sensors. A network of Access Points can provide redundant coverage for a wide area, such as a city or a county and has industry leading range enabling ubiquitous coverage. The Access Point is designed for indoor or outdoor operation and can be easily deployed on buildings, utility poles or communication towers enabling low cost pervasive coverage in the most challenging environments.

Exhibit 1

Network Communication Devices

GE's industrial strength network communication devices are extremely scalable, utilize a common SNMP based network management system, and provide FIPS 140-2 compliant security standards to authenticate and network users. The communication is built using a portfolio of IP-based networking devices, including:

- Fiber and wireless high capacity backhaul products
- Hardened Ethernet switches and serial extension
- Narrowband licensed and unlicensed wireless access technology for non-real-time monitoring and battery powered applications

Furthermore, the solution is integrated on a common management and security platform that enables NERC/CIP compliance across the network.

Exhibit 13.

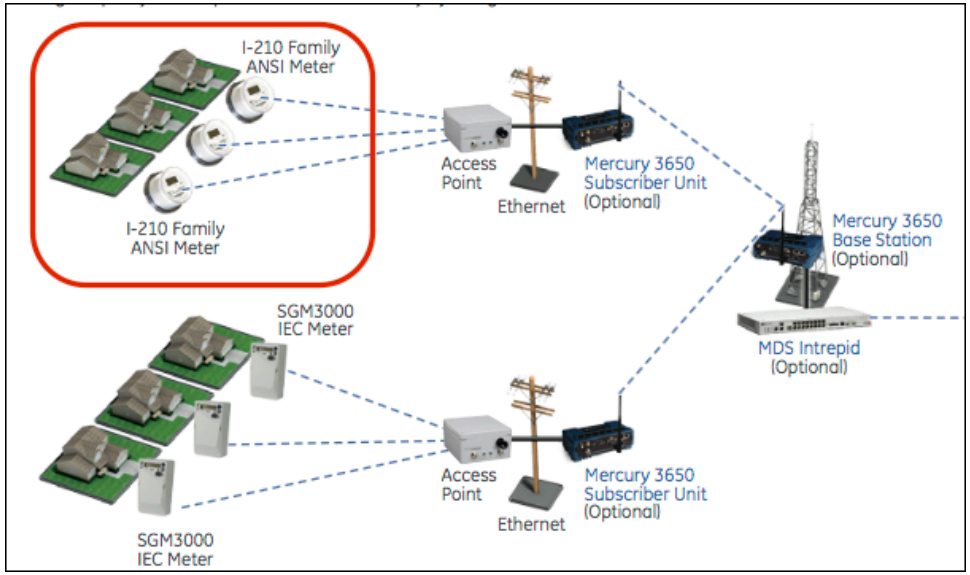

I-210 Family
ANSI Meter
I-210 Family
ANSI Meter
Access
Point
Ethernet
Mercury 3650
Subscriber Unit
(Optional)
Mercury 3650
Base Station
(Optional)
MDS Intrepid
(Optional)
SGM3000
IEC Meter
SGM3000
IEC Meter
Access
Point
Ethernet
Mercury 3650
Subscriber Unit
(Optional)

Exhibit 1

GE's MDS WiYZ™ Remote

MDS WiYZ Remotes are packed with features and functionality to match up with a diverse range of remote monitoring and control requirements. Each Remote accommodates 2 Analog Inputs, 2 Analog Outputs, 2 Digital Inputs and 2 Digital Outputs. One RS232 port is used for configuration.Optional radio configuration to operate on the Grid IQ AMI P2MP network.

- Configurable sample periods allow remotes to periodically sample sensor and I/O data, and transmit back to the gateway at specified intervals, conserving battery power and reducing network traffic.
- Condition-based data transmission allows remote to transmit data only when there is a change of state for a Digital Input.
- I/O extension can be implemented to regenerate sensor and I/O signals between devices.

Exhibit 1

OVERVIEW | AMI / AMR | COMMUNICATIONS | METERMATE SOFTWARE

AMR/AMI Plug and Play Designed

GE's I-210+ meters have been designed to specifically accommodate Smart Grid communications technology, making communications interchangeable and interoperable. As factory integrated and tested communications modules embedded within the smart meter, the I-210 family supports multiple RF Mesh and PLC communication technologies.

All communications is extensively tested to ensure our meters perform flawlessly, even in the harshest of radio frequency (RF) environments.

Factory Integrated Communication Options for I-210+ and I-210+c Meters

AMI TECHNOLOGIES	TYPE	I-210+	I-210+c
Aclara UMT-R	PLC	X	
Ingenu RPMA	RF P2MP	X	X
Itron 54ESS ERT, 55ESS ERT, 56ESS ERT	1-way RF AMR	X	
Itron 57ESS ERT	1-way RF AMR		X
Itron Cellular EVDO & HSPA	Cellular Network		X
Sensus FlexNet	RF P2MP		X
Silver Springs Networks NIC 310	RF Mesh	X	
Silver Springs Networks NIC 410	RF Mesh		X
Silver Springs Networks MicroAP	Cellular & RF Mesh		X
Trilliant SecureMesh	RF Mesh	X	X

Exhibit 9


SMART GRID ENABLED
FEATURES
COMMUNICATIONS
ADVANCED CAPABILITY
SPECIFICATIONS
Communications
The SGM3000 smart meters support modular, field replaceable communications to facilitate wide area network communications. Designed specifically to accommodate the varying types of Smart Grid communications technology, the SGM3000 communications interface supports a broad range of communications options including GPRS, 3G, WiMAX, LTE, RF Mesh and Ethernet.
The communications interface port is common between all SGM3000 variants, allowing a single communications module to suit different meter models. Industry-standard serial interfaces are also available to support connectivity to standalone or multi-drop communications solutions. Direct connect SGM3000 meters also support built-in power line connectivity to facilitate options such as PLC, DLC, HomePlug and legacy Ripple control technologies.
Plug & Play AMI Communications
Multiple communication options on the SGM3000 allows greater customer choice. With modular solutions optimized for cellular, PLC and RF mesh communications technologies, the SGM3000 can cover a wide variety of communication scenarios.
Residential Communication
- ZigBee
SGM3000
Utility Communication
- Radio Frequency Mesh (RF Mesh)
- Power Line Communications (PLC)
- Cellular (GPRS, 3G & LTE) communications
- Ethernet
Utility Monitoring & Control Center
Home Area Network
Not too long ago, the energy meter was considered the end point in a Smart Grid network. As the breadth of the Smart Grid expands into the home with smart appliances, the meter is no longer the end of the network. With this in mind, the SGM3000 includes internal interface ports designed to facilitate ZigBee, HomePlug and other Home Area Network (HAN) technologies.
The HAN interface leverages the Smart Energy Profile, which facilitates advanced energy management applications and load curtailment of intelligent in-home appliances. When integrated with GE's Demand Response Management Systems (DMRS), the SGM3000 can enable concise load management and data aggregation.

Exhibit 10

	Remote "Endpoint" devices, such as utility smart meters or fault indicators, communicate directly with the "Access Points" deployed either on towers or utility poles allowing for flexible low cost deployments. An Endpoint a is device containing a small RF module designed for easy integration and ultra-low power operation in Smart Meters or sensors. A network of Access Points can provide redundant coverage for a wide area, such as a city or a county and has industry leading range enabling ubiquitous coverage. The Access Point is designed for indoor or outdoor operation and can be easily deployed on buildings, utility poles or communication towers enabling low cost pervasive coverage in the most challenging environments. Exhibit 1 *GE provides industrially hardened communications networks for leading industrial and energy companies with best-in-class solutions for exceptional reliability. Our communications solutions include a broad range of high quality industrial wireless, hardened optical networks, broadband power line solutions, professional services and accessories, delivering comprehensive networks that are designed to be flexible and tailored to meet customers' objectives and unique geographic requirements.* *GE supplies rugged communications networks to a variety of markets including energy, oil and gas, mining, water/wastewater and transportation.* Exhibit 6. Accused instrumentalities operate over wireless network components provided by GE:

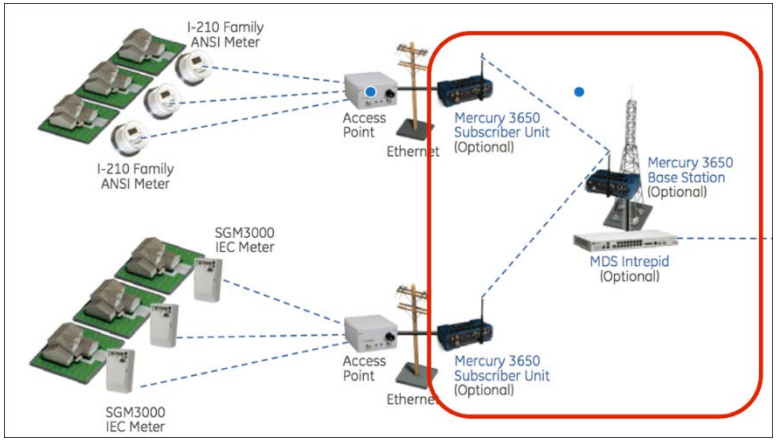


Exhibit 1

Radio Frequency (RF) Mesh and Power Line Carrier (PLC)Networks have been the most widely deployed network architectures for AMI. However, when looking to achieve cost effective, reliable coverage across dense, rural and sparse suburban environments, Grid IQ AMI P2MP is the optimal solution.

RF Mesh offers a cost performance that is best deployed in dense suburban environments. As urban densities increase and suburban densities decrease, the total cost per meter increases drastically for an RF Mesh enabled meter. This is because the network requires the addition of multiple routers and collectors to relay signals through the neighborhood area network as densities decrease.

Exhibit 7.

The Grid IQ AMI P2MP Solution has exceptional coverage and supports multiple applications on the same network. This single network features pervasive coverage for metering and distribution grid monitoring and sensing regardless of whether the devices are battery operated or powered. Each access point in the system system supports thousands of connected devices providing unicast, downlink multicast and broadcast capabilities and supports group configuration and control. The ability to leverage a common network infrastructure for multiple applications provides immediate and significant ROI.

Exhibit 7.

Accused instrumentalities work with a variety of endpoints:

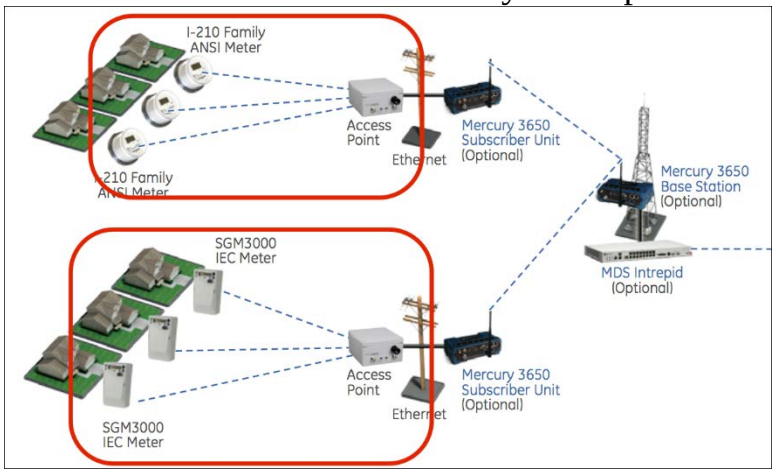
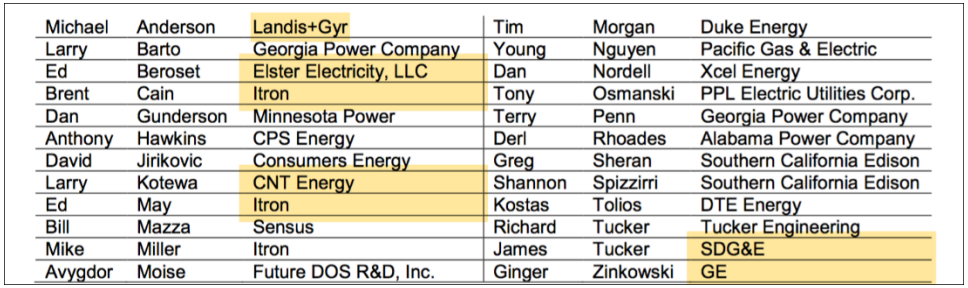
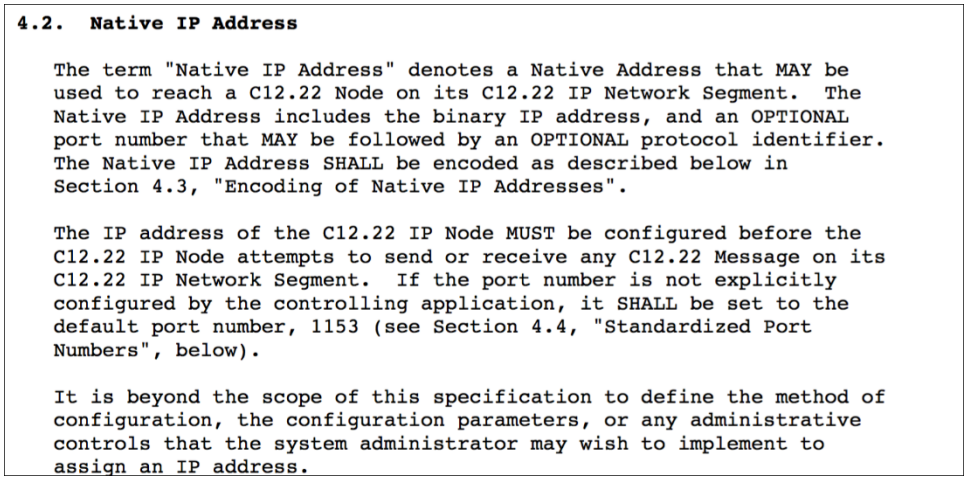


Exhibit 1

	 Exhibit 1
1 (b) storing data relating to recipients, groups and group members, in a memory device, the data comprising a device-specific identifying address for each of a plurality of recipients, one or more group-specific addresses corresponding to each of respective groups of recipients, the groups each comprising selected ones of the plurality of recipients, and group membership data comprising the device-specific identifying addresses of the selected recipients corresponding	*See* '959 Chart at 1 (a) - (b). GE stores in its network (in systems and subsystems related to Grid IQ and analogous offerings discussed in the '959 Charts). GE Grid IQ stores the assigned primary identifying address for each endpoint and one or more group addresses that are shared with selected other recipients. Hardware, software, interfaces, and systems used for storing primary identifying addresses and group addresses (including commands, software, databases, etc.) are Accused Instrumentalities. Grid IQ systems may be delivered to customers by GE or operated by GE under GE's Software-as-a-Service or fully Managed Service solution. To the extent the Software-as-a-Service and Managed Service solution are distinct from the specific systems identified in these contentions, Plaintiff identifies these GE products as additional Accused Instrumentalities. This step may be performed by customers or end users of the Accused Instrumentalities following GE's instructions and using the

to each of the group-specific addresses;	Accused Instrumentalities as directed by GE. Accused Instrumentalities may rely on addressing schemes in accordance with ZigBee, IPv6, and/or ANSCI C12.22 protocols, where a group address is implemented by a multicast and/or broadcast address.  Exhibit 41.  Exhibit 42.

Michael	Anderson	Landis+Gyr	Tim	Morgan	Duke Energy
Larry	Barto	Georgia Power Company	Young	Nguyen	Pacific Gas & Electric
Ed	Beroset	Elster Electricity, LLC	Dan	Nordell	Xcel Energy
Brent	Cain	Itron	Tony	Osmanski	PPL Electric Utilities Corp.
Dan	Gunderson	Minnesota Power	Terry	Penn	Georgia Power Company
Anthony	Hawkins	CPS Energy	Derl	Rhoades	Alabama Power Company
David	Jirikovic	Consumers Energy	Greg	Sheran	Southern California Edison
Larry	Kotewa	CNT Energy	Shannon	Spizzirri	Southern California Edison
Ed	May	Itron	Kostas	Tolios	DTE Energy
Bill	Mazza	Sensus	Richard	Tucker	Tucker Engineering
Mike	Miller	Itron	James	Tucker	SDG&E
Avygdor	Moise	Future DOS R&D, Inc.	Ginger	Zinkowski	GE

4.2. Native IP Address

The term "Native IP Address" denotes a Native Address that MAY be used to reach a C12.22 Node on its C12.22 IP Network Segment. The Native IP Address includes the binary IP address, and an OPTIONAL port number that MAY be followed by an OPTIONAL protocol identifier. The Native IP Address SHALL be encoded as described below in Section 4.3, "Encoding of Native IP Addresses".

The IP address of the C12.22 IP Node MUST be configured before the C12.22 IP Node attempts to send or receive any C12.22 Message on its C12.22 IP Network Segment. If the port number is not explicitly configured by the controlling application, it SHALL be set to the default port number, 1153 (see Section 4.4, "Standardized Port Numbers", below).

It is beyond the scope of this specification to define the method of configuration, the configuration parameters, or any administrative controls that the system administrator may wish to implement to assign an IP address.

4.6. IP Multicast

In addition to unicast, the ANSI C12.22 protocol requires the support of a multicast message delivery service from the network. In cases where C12.22 IP Nodes MUST perform Native IP Address discovery (e.g., the discovery of the Native IP Address of C12.22 IP Relays that provide a route out of the C12.22 IP Network Segment, or the discovery of the Native IP Address of a C12.22 IP Master Relay on the C12.22 IP Network), the C12.22 IP Nodes use IP multicast to send a C12.22 Message that contains an EPSEM Resolve Service Request on the IP LAN.

Exhibit 42.

IP multicast is also desirable, for example, when a C12.22 Host needs to read a multitude of C12.22 Nodes (e.g., meters) that are configured with a common C12.22 multicast group ApTitle. Using IP multicast, the C12.22 Host MAY send a C12.22 Message containing an EPSEM Read Service Request that reaches all C12.22 Nodes on the C12.22 IP Network Segment.

For these reasons, all C12.22 IP Relays and Master Relays SHALL support IP multicast, and it is RECOMMENDED that all C12.22 Nodes support IP multicast. Any IPv4 C12.22 IP Node that supports IP multicast SHALL use the Internet Group Management Protocol version 1 (IGMPv1) [10] as a minimum, to report (i.e., request) membership in the C12.22 multicast group to its local router(s). It is RECOMMENDED that C12.22 IP Nodes implement IGMPv3 [11].

Exhibit 42.

Any IPv6 C12.22 IP Node that supports IP multicast SHALL use Multicast Listener Discovery version 2 (MLDv2) (RFC 3810 [12]), possibly within ICMPv6 (RFC 4443 [13]), to report membership.

Routers that interconnect C12.22 IP Nodes on the C12.22 IP Network Segment MUST support Protocol Independent Multicast - Sparse Mode (PIM-SM) (RFC 4601 [14]) along with IGMPv1 (RFC 1112 [10]) as a minimum for IPv4, or MLDv2 for IPv6 (RFC 3810 [12]). It is RECOMMENDED that they implement IGMPv3 [11]. It is beyond the scope of this specification to define the mechanism for selecting an initial Rendezvous Point (RP) for the C12.22 multicast group, the use of shared versus source trees, or the mechanism for inter-domain multicast routing.

For IPv6, all C12.22 IP Relays, C12.22 IP Master Relays, and all C12.22 IP Nodes configured to support broadcast and multicast (see Section 5.3, "Using IP Broadcast/Multicast", below) SHALL join the global-scope multicast address, FF0E::204, as well as all of the assigned, reduced-scope, multicast addresses:

link-local -- FF02::204;
admin-local -- FF04::204;
site-local -- FF05::204; and
organization-local -- FF08::204.

Exhibit 42.

For IPv4, all C12.22 IP Relays, C12.22 IP Master Relays, and all C12.22 IP Nodes configured to support broadcast/multicast SHALL join the assigned multicast address of 224.0.2.4. This global address does not provide for the type of scoping discussed above for IPv6, nor is it compatible with the administratively scoped IP multicast

Exhibit 42.

4.8. Encoding of Multicast and Broadcast Addresses

ANSI C12.22 Tables provide BINARY Elements for encoding a broadcast or multicast Native IP Address for transport within a C12.22 Message. The encoding of these Table Elements is identical to that defined in Section 4.3, "Encoding of Native IP Addresses". These fields SHALL be used as shown in Figure 2.

Exhibit 42.

Group addresses for relevant devices are stored according to ANSI C12.19 standards.

7.2. Extensions to the IP Module

To support the reception of multicast IP datagrams, the IP module must be extended to maintain a list of host group memberships associated with each network interface. An incoming datagram destined to one of those groups is processed exactly the same way as datagrams destined to one of the host's individual addresses.

Incoming datagrams destined to groups to which the host does not belong are discarded without generating any error report or log entry. On hosts with more than one network interface, if a datagram arrives via one interface, destined for a group to which the host belongs only on a different interface, the datagram is quietly discarded. (These cases should occur only as a result of inadequate multicast address filtering in a local network module.)

https://tools.ietf.org/html/rfc1112

Group Address Binding

The binding of IP host group addresses to physical hosts may be considered a generalization of the binding of IP unicast addresses. An IP unicast address is statically bound to a single local network interface on a single IP network. An IP host group address is dynamically bound to a set of local network interfaces on a set of IP networks.

https://tools.ietf.org/html/rfc1112

6. SENDING MULTICAST IP DATAGRAMS

6.1. Extensions to the IP Service Interface

Multicast IP datagrams are sent using the same "Send IP" operation used to send unicast IP datagrams; an upper-layer protocol module merely specifies an IP host group address, rather than an individual IP address, as the destination. However, a number of extensions may be necessary or desirable.

	https://tools.ietf.org/html/rfc1112 7. RECEIVING MULTICAST IP DATAGRAMS 7.1. Extensions to the IP Service Interface Incoming multicast IP datagrams are received by upper-layer protocol modules using the same "Receive IP" operation as normal, unicast datagrams. Selection of a destination upper-layer protocol is based on the protocol field in the IP header, regardless of the destination IP address. However, before any datagrams destined to a particular group can be received, an upper-layer protocol must ask the IP module to join that group. Thus, the IP service interface must be extended to provide two new operations: JoinHostGroup (group-address, interface) LeaveHostGroup (group-address, interface) https://tools.ietf.org/html/rfc1112

5.3. Using IP Broadcast/Multicast

A C12.22 IP Node's use of broadcast/multicast is based on its capabilities as defined in its configuration parameters (flags) and as expressed in the Node's accepted registration attributes [1] (<connection-type>.BROADCAST_AND_MULTICAST_SUPPORTED). The mapping of the C12.22 IP Node's Broadcast/Multicast parameter (flag) to IP broadcast/multicast usage is defined in Table 2.

C12.22 Broadcast and Multicast Supported Flag	IP Broadcast/Multicast Supported
0	The C12.22 IP Node does not accept IP broadcast, and it does not accept IP multicast messages.
1	The C12.22 IP Node accepts both IP broadcast (IPv4 only) and IP multicast messages (IPv4 and IPv6).

Table 2: C12.22 to IP Broadcast/Multicast Mapping

If a C12.22 IP Node is configured to accept IP broadcast and multicast messages, it SHALL join the "All C1222 Nodes" multicast group (see Section 4.6, "IP Multicast", above), and SHALL use the default port 1153. In addition, it SHALL accept IP network directed or limited (local scope) broadcast messages sent to port 1153. Note that successful communication using network directed broadcast requires configuration of network routers, which by default SHALL NOT forward directed broadcasts as per RFC 2644 [17].

Exhibit 42.

ff00::/8 Example: ff01:0:0:0:0:0:0:2	**Multicast** These addresses are used to identify multicast groups. They should only be used as destination addresses, never as source addresses.	224.0.0.0/4

Exhibit 67.

kV2c Equipped with Cellnet's UtiliNet® AMI

Exhibit 43.

	Cellnet's UtiliNet endpoint provides internal AMR capability to GE's kV2c polyphase commercial and industrial meter. The module is an option board that occupies the modem card slot within the meter. The kV2c equipped with the UtiliNet endpoint is a direct register-read solution which allows the utility to access the full feature set of the kV2c meter. Information such as consumption, power quality, diagnostic, and interval data, as well as any additional data contained in the meter's ANSI® C12.19 tables is accessible through UtiliNet. The endpoint reads this data, can perform demand resets, and analyzes status data. The data returned through the network has the full resolution and the accuracy provided by the meter. Using the flexibility of the meter's ANSI C12.19 tables, the endpoint can also reconfigure the tables for changes in rates. Calendar information can be downloaded from the meter to the endpoint and implemented immediately. Using UtiliNet, no field visits are required; rate changes and calendar updates can be done through the network. Exhibit 43. *GE configures Grid IQ data storage for customers. In general terms and without limiting the scope of these contentions to specific examples, storage may be performed by the Grid IQ head end system and/or database back end. Any data storage and repository*

options offered to customers that are used to store meter data (e.g., primary address, group addresses, and acknowledgement data) are Accused Instrumentalities.

GE stores group addresses that are shared among multiple smart meters.

GE Digital Energy's Grid IQ Solution stores primary identifying addresses for each smart meter.

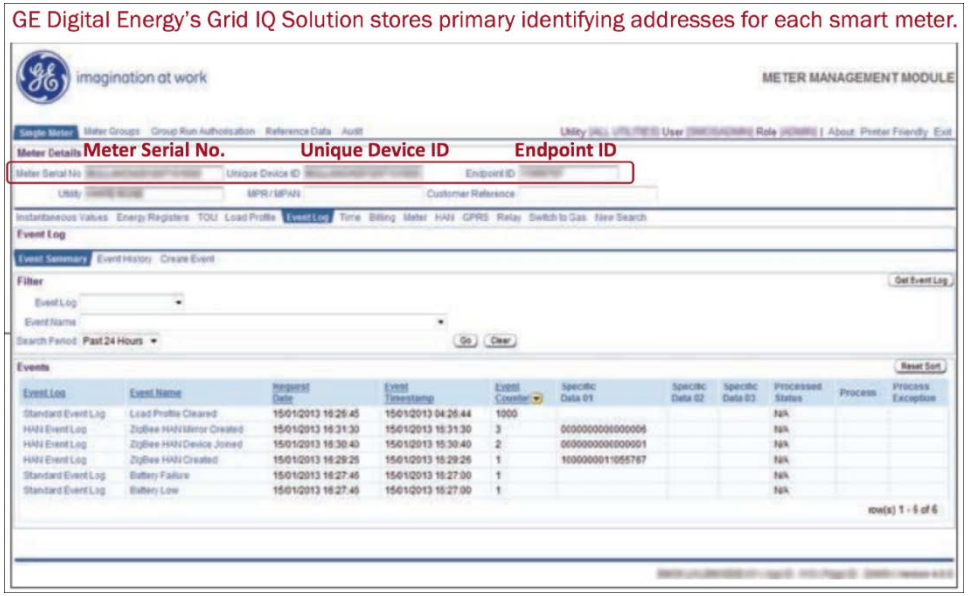


Exhibit 11

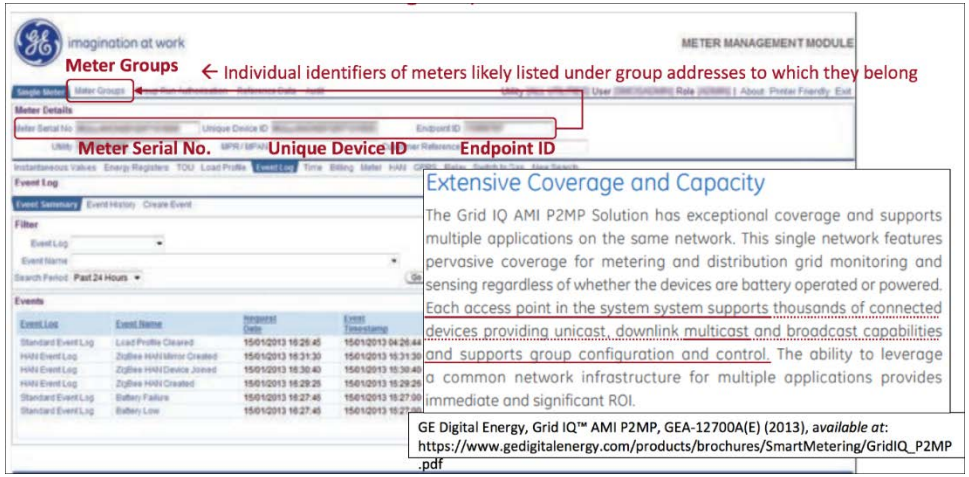


Exhibit 11

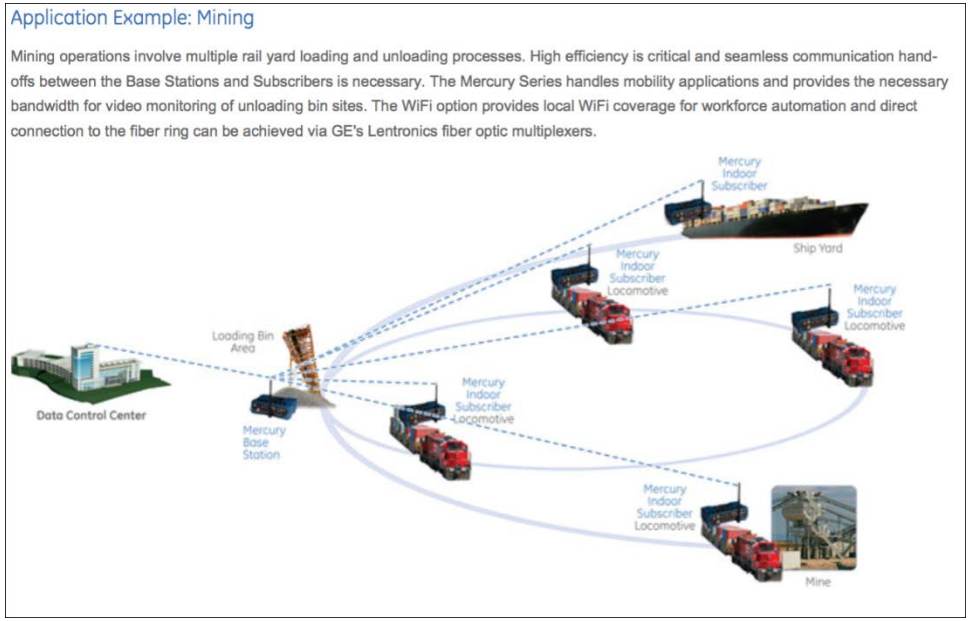


Exhibit 15.

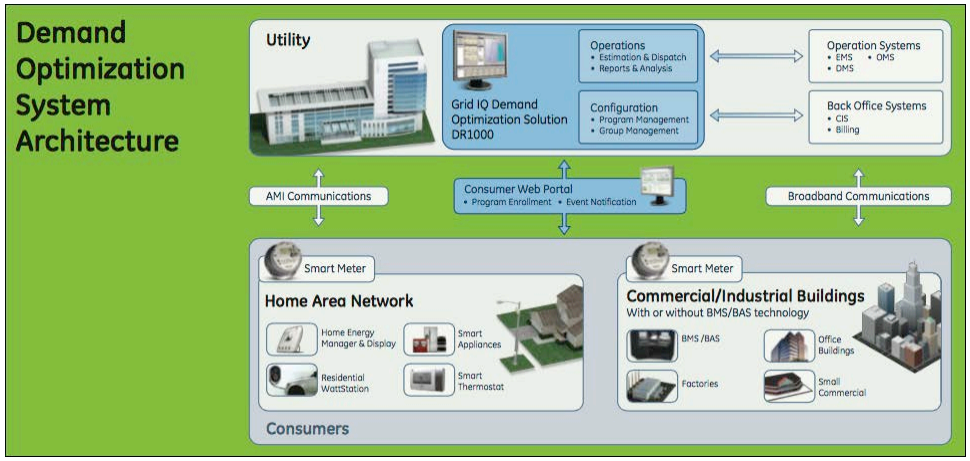


Exhibit 12

Once you determine your demand-shifting objective, GE's DRMS system lets you select from a variety of options based on combinations of consumption demand groups and the remaining level of utility load resources. By

Exhibit 12

Graphs displaying specific group participation, overrides, and a comparison of results of different groups.

Exhibit 12

GE's DRMS is designed to manage demand response programs by establishing policy rules based on tariff specifications. It has the flexibility to establish program groups and sub-groups, and track information at the consumer level to ensure your success.

GE's DRMS provides a straightforward mechanism to import large amounts of data into the system (e.g. system commissioning).

Exhibit 12

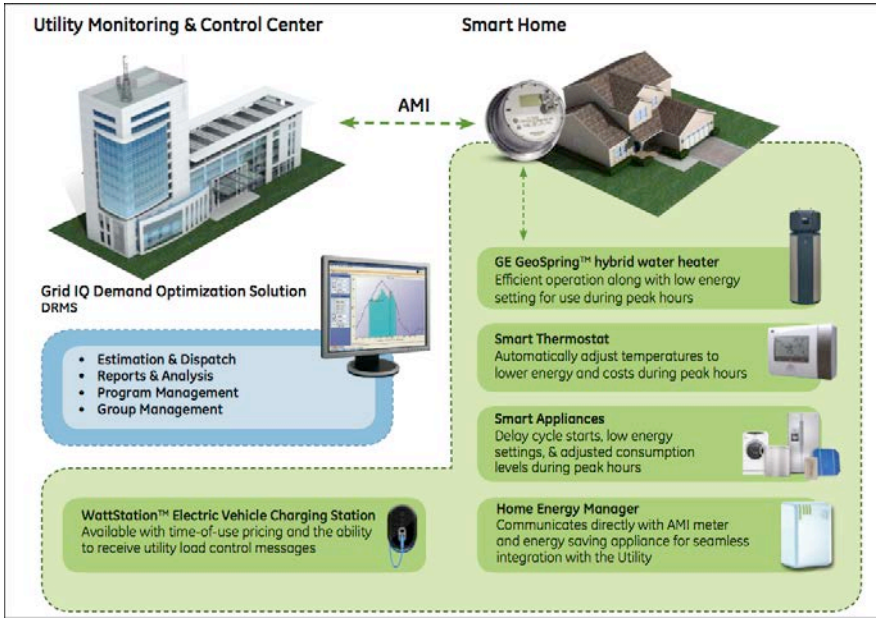
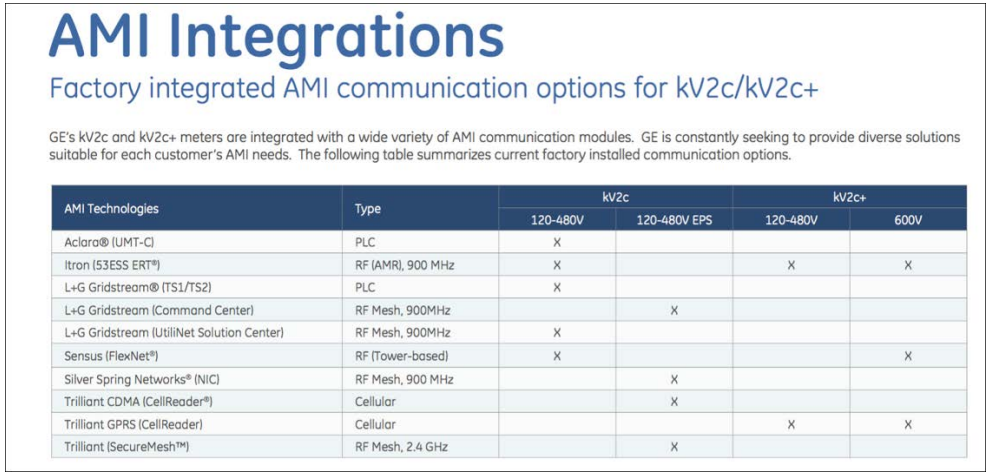


Exhibit 12



AMI Integrations

Factory integrated AMI communication options for kV2c/kV2c+

GE's kV2c and kV2c+ meters are integrated with a wide variety of AMI communication modules. GE is constantly seeking to provide diverse solutions suitable for each customer's AMI needs. The following table summarizes current factory installed communication options.

AMI Technologies	Type	kV2c		kV2c+	
		120-480V	120-480V EPS	120-480V	600V
Aclara® (UMT-C)	PLC	X			
Itron (53ESS ERT®)	RF (AMR), 900 MHz	X		X	X
L+G Gridstream® (TS1/TS2)	PLC	X			
L+G Gridstream (Command Center)	RF Mesh, 900MHz		X		
L+G Gridstream (UtiliNet Solution Center)	RF Mesh, 900MHz	X			
Sensus (FlexNet®)	RF (Tower-based)	X			X
Silver Spring Networks® (NIC)	RF Mesh, 900 MHz		X		
Trilliant CDMA (CellReader®)	Cellular		X		
Trilliant GPRS (CellReader)	Cellular			X	X
Trilliant (SecureMesh™)	RF Mesh, 2.4 GHz		X		

Exhibit 63.

GE's DRMS is designed to manage demand response programs by establishing policy rules based on tariff specifications. It has the flexibility to establish program groups and sub-groups, and track information at the consumer level to ensure your success.

GE's DRMS provides a straightforward mechanism to import large amounts of data into the system (e.g. system commissioning).

Program Management

Create, customize and manage demand optimization programs to meet business and operating objectives. The program administrator can assign each user rights and privileges, and creates an audit trail.

Inventory Management

The inventory management function oversees multiple demand optimization programs, including grouping customers by meters, hierarchy, devices, or other categorizing methods.

Exhibit 12

3.6.6.1 The Group ID Table

The NWK layer of a device may maintain a group ID table, *nwkGroupIDTable*, accessible as an attribute of the NIB as shown in Table 3.44. If the *nwkGroupIDTable* NIB attribute is present then it shall contain a set of 16-bit group identifiers for groups of which the device is a member.

Note that the optional *nwkGroupIDTable* NIB attribute has a functional overlap with the mandatory APS group table (see Table 2.18). If a device maintains both tables, and thereby expects to use NWK-layer multicast as a method for receiving group-addressed frames, it must assure that each 16-bit group identifiers that appears in the APS group table also appears in the NWK group table.

Note also that from an implementation perspective, it would be wasteful to duplicate the list of group identifiers across layers and it is assumed that implementers will find a way to combine the APS and NWK group tables to avoid waste.

2.2.3.1 Application Support Sub-Layer Data Entity (APSDE)

The APSDE shall provide a data service to the network layer and both ZDO and application objects to enable the transport of application PDUs between two or more devices. The devices themselves must be located on the same network.

The APSDE will provide the following services:

- **Generation of the application level PDU (APDU):** the APSDE shall take an application PDU and generate an APS PDU by adding the appropriate protocol overhead.
- **Binding:** once two devices are bound, the APSDE shall be able to transfer a message from one bound device to the second device.
- **Group address filtering:** this provides the ability to filter group-addressed messages based on endpoint group membership.

2.2.3.2 Application Support Sub-Layer Management Entity (APSME)

The APSME shall provide a management service to allow an application to interact with the stack.

The APSME shall provide the ability to match two devices together based on their services and their needs. This service is called the binding service, and the APSME shall be able to construct and maintain a table to store this information.

In addition, the APSME will provide the following services:

- **Binding management:** this is the ability to match two devices together based on their services and their needs.
- **AIB management:** the ability to get and set attributes in the device's AIB.
- **Security:** the ability to set up authentic relationships with other devices through the use of secure keys.
- **Group management:** this provides the ability to declare a single address shared by multiple devices, to add devices to the group, and to remove devices from the group.

2.2.4.5.1 APSME-ADD-GROUP.request

This primitive allows the next higher layer to request that group membership for a particular group be added for a particular endpoint.
and there is space in the table for another entry then the APSME will add a new entry to the group table with the values given by the GroupAddress and Endpoint parameters. After the entry is added to the APS group table, and if the NWK layer is maintaining a group table, then the APSME ensures that the corresponding NWK group table is consistent by issuing the NLME-SET.request primitive, for the *nwkGroupIDTable* attribute, with the list of group addresses contained in the group table of the APS sub-layer. Once both tables are consistent, the APSME issues the APSME-ADD-GROUP.confirm primitive to the next higher layer with a status value of SUCCESS. If no entry for the given GroupAddress and Endpoint is present but there is no room in the group table for another entry, then the APSME will issue the APSME-ADD-GROUP.confirm primitive to the next higher layer with a status value of TABLE_FULL.

	2.2.4.5.1.3 Effect on Receipt After checking the parameters as described above, the APSME will check the group table to see if an entry already exists containing the values given by the GroupAddress and Endpoint parameters. If such an entry already exists in the table then the APSME will issue the APSME-ADD-GROUP.confirm primitive to the next higher layer with a status value of SUCCESS. If there is no such entry
1 (c) providing the mobile device corresponding to each of the plurality of recipients with at least a subset of the data stored in the memory device, the at least a subset of the data being stored in the mobile device and comprising its corresponding device-specific identifying address and the group-specific address of each group to which that recipient belongs as a group member;	*See* 1(b) above.
1 (d) wirelessly broadcasting a group message addressed to a selected one of the group addresses, each of the mobile devices being configured to receive the broadcast group message, to analyze a group-specific address provided with the group message, and	*See* '959 Chart 1 (a) - (e). Endpoints with communication modules are configured to receive broadcast group messages by being preprogrammed with group addresses. They perform within GE's addressing scheme (e.g. IPv6 group addressing, broadcasting, and multicasting schemes) to receive messages, analyze a group-specific address, and send responses GE systems include network infrastructure that wirelessly broadcasts group messages to endpoints. Endpoints in the Accused Instrumentalities include communication modules configured to receive broadcast group

send a response when the group-specific address in the group message is determined to be for a group to which that mobile device belongs;	messages by being preprogrammed with group addresses. They perform within GE's addressing scheme (e.g. IPv6 group addressing, broadcasting, and multicasting schemes) to receive messages, analyze a group-specific address, and send responses. Accused Instrumentalities may rely on addressing schemes in accordance with ZigBee, IPv6, and/or ANSI C12.22 protocols, where a group address is implemented by a multicast and/or broadcast address. C12.22 compliant endpoints are configured to receive broadcast group messages. Accused Instrumentalities include hardware, software, interfaces, and subsystems that send, receive, originate, format, select, transmit, relay, store, or handle acknowledgements from endpoints, where the acknowledgements traverse a wireless component (e.g., transmitter, transceiver, receiver) and (1) indicate successful receipt of a communication by the endpoint and/or (2) indicate a communication was read, carried out, processed, completed, etc. by the endpoint (e.g., meter). Accused Instrumentalities in a portion of deployments rely upon ZigBee and/or ANSI C12.22 protocol acknowledgement messages.

1 (e) monitoring for responses to the group message from the group members of the group identified by a group-specific address provided in the group message; and	*See* '959 Chart at 1(f). Endpoints send ACKs that include the group address. GE head-end systems and collectors monitor for responses from endpoints and DA nodes that are sent in response to group messages. Acknowledgements sent in response to group addressed messages are transmitted by GE system endpoints.

1 (f) storing acknowledgement data in the memory device for each of the group members, the acknowledgement data comprising a listing of each of the group members and an indication of response for each of the group members, the indication of response comprising at least one of an indication of no response when that group member has not yet responded to the group message, and an indication of response when a response sent by the mobile device of that group member has been received.	*See* '959 Chart at 1(f) and 1(g). GE system stores acknowledgment data in its network for each group member. The acknowledgment data includes a list of group members and indications of whether communication of messages have been successful. In some applications, nonresponsive endpoints appear in red. In some applications, responsive endpoints appear and green. These graphical representations of endpoints indicate store acknowledgment data.

Claim 2 – GE Systems	
2. A method as claimed in claim 1, wherein at least one of providing and synchronizing are performed using wireless communication to the mobile devices.	*See* '959 Chart at 1. GE systems provide smart meter and DA endpoints with data wirelessly using RF. Synchronizing and updating is performed over the air.
Claim 3 – GE Systems	
3. A method as claimed in **1**, wherein the mobile devices transmit their responses wirelessly.	GE system endpoints with radio modules (e.g., endpoint communication modules) transmit wirelessly using RF. *See* '959 Chart at 1.
Claim 4 – GE Systems	
4. A method as claimed in **1**, wherein the group message is sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	*See* '959 Chart at 1. GE system transmitters send group messages using one or more of cellular, two-way radio, and wireless network communications. GE systems employ wireless networks for alerting groups of recipient endpoints (e.g., electric meter communication modules). Such wireless networks and meters with communication modules are Accused Instrumentalities used to perform steps of the claimed methods. GE systems flexibly utilize available wireless network infrastructure, dedicated wireless infrastructure, or ad hoc wireless network infrastructure. Alternatively, GE may provide wireless infrastructure used to perform the claimed steps. Wireless networks used in GE systems include cellular, WiMAX, and other commercially available wireless networks.

Claim 5 – GE Systems	
5. A method as claimed in **1**, wherein the responses are sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	*See* '959 Chart at 1. GE system endpoints send ACKs using one or more of cellular, two-way radio, and wireless network communications. GE systems employ wireless networks for alerting groups of recipient endpoints (e.g., electric meter communication modules). Such wireless networks and meters with communication modules are Accused Instrumentalities used to perform steps of the claimed methods. GE systems flexibly utilize available wireless network infrastructure, dedicated wireless infrastructure, or ad hoc wireless network infrastructure. Alternatively, GE may provide wireless infrastructure used to perform the claimed steps. Wireless networks used in GE systems include cellular, WiMAX, and other commercially available wireless networks.
Claim 10 – GE Systems	
10. A method as claimed in **1**, further comprising: updating at least one of the device-specific identifying addresses, the group-specific addresses and the group membership data stored in the memory device whenever a recipient, group or group member is added or deleted; and synchronizing data stored in each mobile device with the data stored in	*See* '959 Chart at 17.

the memory device.	
Claim 11 – GE Systems	
11. (a) A deterministic group messaging system providing acknowledged group messaging comprising:	*See* '959 Chart at 1(a). The preamble is not limiting. GE operates the GE system and subsystems (and associated hardware and software) which make up a deterministic group messaging system that provides acknowledged group messaging as described in detail in the '959 infringement claim chart.

11. (b) a memory device configured to store a device-specific identifying address for each of a plurality of responder devices, a group-specific address corresponding to each of respective groups of responder devices, the groups of responder devices each comprising selected ones of the plurality of responder devices, and group membership data comprising the device-specific identifying addresses of the selected responder devices to each of the group-specific addresses wherein each of the plurality of responder devices is provided with at least a subset of the data stored in the memory device, the at least a subset of data being stored in the responder device and comprising its corresponding device-specific identifying address and the group-specific address of each group to which that	*See* 1(b) and 1(c) above. The GE system endpoints with modules are responder devices. GE's network includes at least one memory device (e.g., application, server, hard drive, database, memory module) for storing meter identification addresses which are device-specific and group-specific. This information is also provided to (e.g., for storage in) the responder device (e.g., meters).

responder device belongs as a group member; and	
11 (c) a control module comprising a processing device that is configured to access the memory device and is programmed to wirelessly broadcast a group message addressed to a selected one of the group addresses,	*See* 1(b) and 1(c) above. Transmissions of group communications include unique identifiers for individual smart meters (e.g., meter ID's, meter addresses, or network addresses.)

	The base station broadcasts actions to a group of smart meters via a wireless network.
11 (d) each of the responder devices being configured to receive the broadcast group message, to analyze a group-specific address provided with the group message, and send a response when the group-specific address in the group message is determined to be for a group to which that responder device belongs,	*See* 1(g) above.
11 (e) monitor for responses to the group message from the group members of the group identified by a group-specific address provided in the group message,	*See* 1(h) above.
11(f) and store acknowledgement data in the memory device for each of the group members, the acknowledgement data comprising a listing of each of the group members and an indication of response for each of the group members, the indication of response comprising	*See* 1(f) above.

at least one of an indication of no response when that group member has not yet responded to the group message, and an indication of response when a response sent by the responder device of that group member has been received.	
Claim 12– GE Systems	
12. A system as claimed in claim 11, wherein the control module is configured to provide each of the plurality of responder devices with at least a subset of the data stored in the memory device using wireless communication to the responder devices.	*See* '959 at 1. GE's head-end system causes configuration of and communication with endpoints to occur wirelessly using RF communications.
Claim 13 – GE Systems	
13. A system as claimed in 11, wherein the responder devices transmit their responses wirelessly.	GE system enabled communication modules transmit wirelessly.
Claim 14 – GE Systems	
14. A system as claimed in 11, wherein the group message is sent using at least one of paging communications, cellular communications, two-way radio	GE system employs cellular communications, two-way radio communications, and/or a wireless network for group messages.

communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and a wireless network.	
Claim 15 – GE Systems	
15. A system as claimed in 11, wherein the responses are sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	GE system employs cellular communications, two-way radio communications, and/or a wireless network for responsive messages (e.g., ACKs).
Claim 16 – GE Systems	
16. A system as claimed in 11, wherein the group message has a message	*See* '959 Chart at 13 and 17.

identifier and the responses comprise the message identifier to facilitate associating responses to corresponding group message.	GE systems broadcast messages with message identifiers (e.g., event IDs, message numbers, etc.) and associate received responses with message identifiers. For example: The C12.22 standard provides for message identifier correspondence to relate responses to group messages. Active-OPEN UDP Active-OPEN UDP is a state used by a local C12.22 IP Node to expect and receive incoming C12.22 Messages that it solicited from a foreign C12.22 IP Node using the UDP. The local C12.22 IP Node MAY exit the Active-OPEN UDP state when it has received all of the expected C12.22 Messages or a C12.22 Message timeout has occurred. The local C12.22 IP Node receives all C12.22 Response Messages solicited from the foreign C12.22 IP Node that arrive at the local port number that matches the source port number used to solicit the C12.22 Messages from the foreign C12.22 IP Node. C12.22 Request Message A fully assembled C12.22 APDU that contains an ACSE user information element, which includes one or more EPSEM service requests. C12.22 Response Message A fully assembled C12.22 Message APDU that contains an ACSE user information element, which includes one or more EPSEM service responses.
Claim 20 – GE Systems	
20. A system as claimed in 11, wherein the control module is further	*See* '959 Chart at 17.

configured to update at least one of the device-specific identifying addresses, the group-specific addresses and the group membership data stored in the memory device whenever a recipient, group or group member is added or deleted, and synchronize data stored in each responder with the data stored in the memory device.	
Claim 21 – GE Systems	
21. A system as claimed in claim 20, wherein the control module is configured to synchronize data stored in each responder with the data stored in the memory device using wireless communication to the responder devices.	*See* '959 Chart at 1 and 17. *See* 12 above.

EXHIBIT C

GroupChatter, LLC v. GE USA Inc., Civil Action No. 15-cv-863-JRG
Plaintiff's LPR 4.1 INFRINGEMENT CONTENTION CLAIM CHART – U.S. PATENT NO. 9,014,659

GroupChatter presently asserts GE infringes claims 1, 2, 3, 4, 8, 10, 11, 12, 13, and 16, directly and indirectly. This chart sets forth Plaintiff's infringement contentions relating to the '659 Patent and the GE Accused Instrumentalities (as set forth in the '959 and '740 Charts). Identification of the Accused Instrumentalities is made with as much specificity as possible with model names or numbers and methods provided if known. Specific configurations and deployed elements of the GE Accused Instrumentalities may differ, and the specifics of each deployment are not generally available to the public.

These contentions articulate the structure and acts that constitute direct infringement of the '659 patent and identify specifically where each element of each asserted claim is found within each Accused Instrumentality. This disclosure is not intended to describe all acts of inducement or contributory infringement GE has and continues to commit by providing, developing, installing, testing, deploying, and directing the use of GE Accused Instrumentalities by GE customers and end users. As discovery proceeds, these contentions and the specific GE components identified here as meeting certain claim elements or performing certain claim steps may change in view of claim construction and additional information learned through discovery.

Claim 1 – GE System	
1 (a) A method of alerting a group of recipients over a wireless network and providing acknowledged group messaging, each recipient comprising at least one mobile device capable of transmitting and receiving data, the method comprising the steps of:	*See* '740 Chart at 1 (a). The preamble is not limiting. GE performs the method by operating at least one Grid IQ system or Accused Instrumentality (e.g., AMI system) as described in the '959 Chart. The GE Systems include a wireless network for alerting groups of recipients. GE alerts groups of recipients over the wireless network and provide acknowledged group messaging. Endpoints (e.g., meters) with Personality Modules acknowledge receipt of messages.

1 (b) storing data relating to recipients, groups and group members, in a memory device, the data comprising a recipient identifier for each of a plurality of recipients, one or more group identifiers corresponding to each of respective groups of recipients, the groups each comprising selected ones of the plurality of recipients, and group membership data comprising the recipient identifiers of the selected recipients corresponding to each of the group identifiers;	*See* '740 Chart at 1 (b).
1 (c) providing the mobile device corresponding to each of the plurality of recipients with at least a subset of the data stored in the	*See* '740 Chart at 1 (c).

memory device, the subset of the data being stored in the mobile device and comprising its corresponding recipient identifier and the group identifier of each group to which that recipient belongs as a group member;	
1 (d) wirelessly transmitting a group message to the mobile device corresponding to each recipient in a selected group of recipients, each of the mobile devices being configured to receive the broadcast group message and send a response when the group message is determined to be for a group to which that recipient belongs as a group member;	*See* '740 Chart at 1 (d).
1 (e) monitoring for responses to the group message from the group members;	*See* '740 Chart at 1 (e).
1 (f) storing acknowledgement	*See* '740 Chart at 1 (f).

data in the memory device for each of the group members, the acknowledgement data comprising a listing of each of the group members and an indication of response for each of the group members, the indication of response comprising at least one of an indication of no response when that group member has not yet responded to the group message, and an indication of response when a response sent by the mobile device of that group member has been received;	
1 (g) determining a type of message to send to at least one recipient based on the stored acknowledgement data; and 1 (h) wirelessly transmitting the message to the at least one	GE Grid IQ determines to ping meters based on stored acknowledgement data.

recipient.	
Claim 2 – GE System	
2. A method as claimed in claim 1, wherein the group message is sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	*See* '740 Chart at 4.

Claim 3 – GE System	
3. A method as claimed in claim 1, wherein the responses are sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	*See* '740 Chart at 5.
Claim 4 – GE System	
4. A method as claimed in claim 1, wherein the message transmitted to the at least one recipient is sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard	*See* '740 Chart at 4 and '959 Chart at 1(a).

for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	
Claim 8 – GE System	
8. A method as claimed in claim 1, further comprising: updating at least one of the recipient identifier, the group identifier and the group membership data stored in the memory device whenever a recipient, group or group member is added or deleted; and updating data stored in a mobile device based on the data stored in the memory device.	*See* '740 Chart at 10.
Claim: 10 – GE System	
10 (a) A deterministic group messaging system providing acknowledged group messaging comprising:	*See* '740 Chart at 11(a). The preamble is not limiting. GE systems (and associated hardware and software) which make up a deterministic group messaging system that provides

	acknowledged group messaging.
10 (b) a memory device configured to store a recipient identifier for each of a plurality of recipients, a group identifier corresponding to each of respective groups of recipients, the groups each comprising selected ones of the plurality of recipients, and group membership data comprising the recipient identifiers of the selected recipient corresponding to each of the group identifiers, wherein at least one mobile device corresponding to each of the plurality of recipients is provided with at least a subset of the data stored in the memory device, the subset of data being stored in the mobile device and comprising its corresponding recipient	*See* '740 Chart at 11(b).

identifier and the group identifier of each group to which that recipient belongs as a group member; and	
10 (c) a control module comprising at least one processing device that is configured to access the memory device and is programmed to wirelessly transmit a group message to the mobile device corresponding to each recipient in a selected group of recipients,	*See* '740 Chart at 11(c).
10 (d) each of the mobile devices being configured to receive the group message and send a response when the group message is determined to be for a group to which that recipient belongs as a group member,	*See* '740 Chart at 11(d).
10 (e) monitor for responses to the group message,	*See* '740 Chart at 11(e).
10 (f) store acknowledgement data in the memory device for each of the group members,	*See* '740 Chart at 11(f), 11 (g), and 11(h)

the acknowledgement data comprising a listing of each of the group members and an indication of response for each of the group members, the indication of response comprising at least one of an indication of no response when that group member has not yet responded to the group message, and an indication of response when a response sent by the recipient device of that group member has been received,	
10 (g) determine a type of message to send to at least one recipient based on the stored acknowledgement data,	*See* 1(g) above.
10 (h) and wirelessly transmit the message to the at least one recipient.	*See* 1(h) above.

Claim: 11 – GE System	
11. A system as claimed in claim 10, wherein the group message is sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and a wireless network.	*See* 2 above.
Claim: 12 – GE System	
12. A system as claimed in claim 10, wherein the responses are sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area	*See* 3 above.

network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	
Claim: 13 – GE System	
13. A system as claimed in claim 10, wherein the message transmitted to the at least one recipient is sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	*See* 4 above.
Claim: 16 – GE System	
16. A system as claimed in claim	*See* 8 above and '207 Chart at 8 (e) and 11.

10, wherein the control module is further configured to update at least one of the recipient identifier, the group identifier and the group membership data stored in the memory device whenever a recipient, group or group member is added or deleted, and update data stored in a mobile device based on the data stored in the memory device.	

EXHIBIT D

GroupChatter, LLC v. GE, Civil Action No. 15-cv-486-WSD
Plaintiff's LPR 4.1 INFRINGEMENT CONTENTION CLAIM CHART – U.S. PATENT NO. 8,588,207

GroupChatter presently asserts GE infringes claims 1, 2, 3, 8, 9, and 11, directly and indirectly. This chart sets forth Plaintiff's infringement contentions relating to the '207 Patent and the GE Accused Instrumentalities (as set forth in the '959 and '740 Charts). Identification of the Accused Instrumentalities is made with as much specificity as possible with model names or numbers and methods provided if known. Specific configurations and deployed elements of the GE Accused Instrumentalities may differ, and the specifics of each deployment are not generally available to the public.

These contentions articulate the structure and acts that constitute direct infringement of the '207 patent and identify specifically where each element of each asserted claim is found within each Accused Instrumentality. This disclosure is not intended to describe all acts of inducement or contributory infringement GE has and continues to commit by providing, developing, installing, testing, deploying, and directing the use of GE Accused Instrumentalities by GE customers and end users. As discovery proceeds, these contentions and the specific GE components identified here as meeting certain claim elements or performing certain claim steps may change in view of claim construction and additional information learned through discovery.

Claim 1 – GE System	
1 (a) A method of alerting a group of recipients over a wireless network and providing acknowledged group messaging, each recipient comprising at least one mobile device capable of transmitting and receiving data, the method comprising the steps of:	To the extent the preamble is limiting, GE practices the method by operating GE Systems (as described in the '959 Chart) for alerting groups of endpoints over its wireless network to provide acknowledged group messaging. *See* '740 Chart at 1(a).
1 (b) storing data relating to recipients, groups and group members, in a memory device, the	*See* '740 Chart at 1(b).

data comprising a recipient identifier for each of a plurality of recipients, one or more group identifiers corresponding to each of respective groups of recipients, the groups each comprising selected ones of the plurality of recipients, and group membership data comprising the recipient identifiers of the selected recipients corresponding to each of the group identifiers;	
1 (c) providing the mobile device corresponding to each of the plurality of recipients with at least a subset of the data stored in the memory device, the subset of the data being stored in the mobile device and comprising its corresponding recipient identifier and the group identifier of each group to which that recipient belongs as a group member;	*See* '740 Chart at 1(c).

1 (d) wirelessly transmitting a group message to the mobile device corresponding to each recipient in a selected group of recipients, each of the mobile devices being configured to receive the group message and send a response when the group message is determined to be for a group to which that recipient belongs as a group member;	*See* '740 Chart at 1(d).
1 (e) monitoring for responses to the group message from the group members; and	*See* '740 Chart at 1(e).
1 (f) storing acknowledgement data in the memory device for each of the group members, the acknowledgement data comprising a listing of each of the group members and an indication of response for each of the group members, the indication of response comprising at least one of an indication of no response when that group member has	*See* '740 Chart at 1(f).

not yet responded to the group message, and an indication of response when a response sent by the mobile device of that group member has been received.	
Claim 2 – GE System	
2. A method as claimed in claim 1, wherein the group message is sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	GE System transmitters send group messages using one or more of cellular, two-way radio, and wireless network communications. *See* '740 Chart at 4.
Claim 3 – GE System	
3. A method as claimed in claim 1, wherein the responses are sent using at least one of paging	GE System endpoints send ACKs using one or more of cellular, two-way radio, and wireless network communications.

communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and wireless network.	*See* '740 Chart at 5.
Claim: 8 – GE System	
8 (a) A deterministic group messaging system providing acknowledged group messaging comprising:	To the extent the preamble is limiting, GE operates the GE System and subsystems (and associated hardware and software) which make up a deterministic group messaging system. *See* '740 Chart at 11(a).
8 (b) a memory device configured to store a recipient identifier for each of a plurality of recipients, a group identifier corresponding to each of respective groups of recipients, the groups each comprising selected ones of the plurality of recipients, and group membership data comprising	GE group names and group aliases are group identifiers *See* '740 Chart at 11(b).

the recipient identifiers of the selected recipient corresponding to each of the group identifiers, wherein at least one mobile device corresponding to each of the plurality of recipients is provided with at least a subset of the data stored in the memory device, the subset of data being stored in the mobile device and comprising its corresponding recipient identifier and the group identifier of each group to which that recipient belongs as a group member; and	
8 (c) a control module comprising at least one processing device that is configured to access the memory device and is programmed to wirelessly transmit a group message corresponding to one of the groups of recipients,	*See* '740 Chart at 11(c).

8 (d) each of the mobile devices being configured to receive the group message and send a response when the group message is determined to be for a group to which that recipient belongs as a group member,	*See* '740 Chart at 11(d).
8 (e) monitor for responses to the group message, and store acknowledgement data in the memory device for each of the group members, 8 (f) the acknowledgement data comprising a listing of each of the group members and an indication of response for each of the group members, 8 (g) the indication of response comprising at least one of an indication of no response when that group member has not yet responded to the group message, and an indication of response when a response sent by the recipient device of that group member has been	*See* '740 Chart at 11(e), 11(g), 11(h).

received.	
Claim: 9 – GE System	
9. A system as claimed in claim 8, wherein the group message is sent using at least one of paging communications, cellular communications, two-way radio communications, wireless local-area network employing IEEE 802.11 standard for "Wi Fi", wireless metropolitan-area network employing IEEE 802.16 standard for "WiMAX", wireless area network employing IEEE 802 standard communications, wireless broadband network, and a wireless network.	*See* 2 above.
Claim: 11 – GE System	
11. A system as claimed in claim 8, wherein the control module is further configured to update at least one of the recipient identifier, the group identifier and the group membership data stored in the memory device whenever a recipient, group or group member is added or	*See* '740 Chart at 20.

deleted, and update data stored in a mobile device based on the data stored in the memory device.	