FlexNet

Frequently Asked Questions

Fixed Network AMI: Water and Gas

What is Sensus FlexNet Fixed Network?

FlexNet Fixed Network is a wide area Advanced Metering Infrastructure (AMI) system that provides the ability to read water, gas, and electric meters with a common AMI platform. The FlexNet system is designed around the central concepts of Simplicity, Flexibility, and Reliability. The Flex-Net Network supports one-way radio frequency (RF) endpoints for water/gas and a two-way RF system for electric.

What type of radio technology is used in the fixedbase network?

FlexNet Endpoints and Tower Gateway Base Stations (TGB) utilize a single, "Primary Use" (unshared) licensed band in 890-960 MHz spectrum.

What is a "Primary Use" or "unshared" licensed band?

A "Primary Use" license allows Sensus FlexNet to remove potential interferers from Sensus' channels who are not in compliance with FCC regulations.

Will the network be less vulnerable to interference because it operates in a "primary use: licensed band?

Yes. The FlexNet system uses exclusively licensed radio frequencies that are strongly protected by the Federal Communications Commission (FCC). The FCC is bound by law to take action against frequency interferers in the "Primary Licensed" FlexNet spectrum. Sensus stands ready to protect our valuable dedicated spectrum through a variety of legal methods.

Do other fixed base system providers utilize a licensed frequency?

Yes, they do. However, those licensed systems utilize frequencies that are not "Primary Use' frequencies. These systems operate in a licensed voice band but AMR/AMI systems using these frequencies must operate as "secondary users" under the FCC telemetry provisions. These second tier or "secondary users" can be interfered with or slowed down by a voice or "Primary user". If the interference is severe enough to effect the performance of the system a new frequency must be acquired and the endpoints and receivers modified to operate under this new frequency.

What is a propagation study and how does it help in the deployment planning?

Reliable transmission range is crucial to the operation of a properly designed network. Sensus utilizes sophisticated propagation modeling incorporating the specific variables for the utility's coverage area to determine the optimum infrastructure placement.

Propagation modeling incorporates such factors as geographic and topographic parameters of the endpoint locations and proposed sites of TGB's. Once the modeling is complete, a proposal will be discussed with the utility outlining implementation and infrastructure requirements.

What reception range can I expect from an endpoint?

Range is affected by several variables including:

- Height of the collecting receiver's antennae – The Sensus FlexNet satisfies the first variable by placing a TGB(s) on utility towers (when available) or on tall, existing radio towers.
- Radio spectrum used to broadcast the data transmissions – The "Primary Use" licensed band used by the FlexNet system provides the utility with an interference protected spectrum.
- High powered endpoints. – Another advantage of the licensed frequency band is that total RF output power of 2 Watts is higher than that for systems using a license free band, typically between 100 milliwatt and 1 Watt.
- Sensitive receivers at the data collection points – The FlexNet system uses the latest in DSP (digital signal processing) technology in the TGB's to make its receiver extremely sensitive; up to -121dBm.

Can the endpoints read any other meter besides Sensus?

Water transmitters interface to Sensus ICE registers and legacy ECR registers with encoder outputs and Neptune ARB VI registers. Gas residential transmitters are compatible with Sensus, American, and Actaris models. Commercial and Industrial gas meters can install a remote mount transmitter provided an "A" pulse output is available at the meter.

What is the expected battery life for transmitters?

All Sensus water and gas transmitters come with a twenty year nationally published warranty. For terms and conditions refer to Sensus G-500 and FlexNet Gas Transmitter Limited Warranty.

Is the battery pack field replaceable?

Water transmitters have the option of a field replaceable external battery.

How often does the FlexNet endpoint read the meter and send the meter and reading data?

The FlexNet water and gas transmitters have the ability to read each hour and transmit four (4) times per day; or read every six (6) hours and transmits four (4) times per day.

For inside meter sets, is it necessary to have the endpoint installed on the outside of the house?

For optimal system performance Sensus recommends installing the endpoint on the outside of the structure.

What is the Tower Gateway Base Station (TGB)?

The Tower Gateway Base Station (TGB) receives and processes the readings from the meter endpoints in the field and sends the data to the Regional Network Interface (RNI) for database storage where it can be viewed by the utility personnel through the Sensus Meter Data Manager (MDM).

Which locations are suitable for a Tower Gateway Base Station (TGB)?

A high point such as a water tower, communications tower or building rooftop, preferably without any large obstacles (e.g. larger building) adjacent to it. All proposed TGB sites must have access to electrical power and a TCP/IP communication link to send messages to the RNI.

What is the difference between an Indoor TGB and an Outdoor TGB?

The indoor TGB is to be placed in an existing environment that is temperature controlled. In the case where an existing temperature controlled environment is not available, an outdoor enclosure is used to house the TGB. The outdoor TGB is a weather tight, temperature controlled unit. Both TGB's offer the same performance.

What type of power is required at the TGB site?

The Indoor TGB requires 120 VAC. The Outdoor TGB requires 220 VAC.

What types of communication options are available for sending information from the TGB back to the Regional Network Interface (RNI)?

A network connection supporting TCP/IP (internet protocol) packet data communication is required at the site. Examples for suitable communications service types are Frame Relay, cable internet, DSL internet, AFAR Wireless Bridge, or dedicated line (point-to-point).

Once the data leaves the TGB, where is the information sent?

The TGB receives and decodes messages and then immediately transfers each message using a proprietary packet data protocol to the metering database housed in the Regional Network Interface (RNI). Data from the endpoint reaches the RNI immediately without any data processing or reduction in message content along its path. Once at the RNI, the data becomes available for view in Sensus Meter Data Manager (MDM) software.

If I install an antenna at the TGB receiver site, will it interfere with other antennas located at that site? (i.e. cell)

The TGB antenna is unlikely to cause any interference, assuming vertical separation is maintained. Interference caused by other antennas at the site would be evaluated during a pre-installation site survey.

How should the antenna be installed to get the maximum performance?

Generally, maximum performance is achieved by installing the antenna at the highest point available. It is recommended to maintain vertical separation of 10' or more between antennas at the same site.

Since the FlexNet system requires a minimal number of collectors compared to other fixed base AMI systems, what happens to reading data if the TGB becomes inoperable due to some kind of malfunction?

Each TGB is equipped with a battery that provides eight (8) hours of auxiliary power should the site experience loss of power. In addition, should communications be lost between the TGB and the RNI, the TGB has the ability to store up to thirty (30) days worth of data. One of the most beneficial features of the transmitters is its ability to transmit historical data. Should the TGB become completely inoperable, the transmitters have the ability to transmit historical reading data of 8 to 168 readings depending on the amount of consumption on the meter.

What is the Regional Network Interface (RNI)?

The RNI for Water and Gas consists of 2 Dell Servers. The first server is called the Network Controller (NC). The NC server maintains communications with the TGB(s) and routes the data to the Utility Information Platform (UIP). The second server is the UIP. The UIP is a database server that collects the raw meter data from the NC.

What is the Sensus Meter Data Manager (MDM)?

The MDM is a browser-based application that shows meter reading data in a user friendly interface and allows the utility to view the information from any PC connected to the network.

The MDM acts as a middleware between the customers billing system and the Sensus FlexNet RNI. The MDM has the ability to import data from the customer billing system and export meter reading data back to the customer billing system. The import and export formats for MDM are configurable and managed by the user.

The MDM provides reports for management of the meters within the FlexNet system as well as graphical and table views of meter reading information.

How much information will the MDM hold for viewing?

The MDM will maintain a thirteen (13) month history of meter reading data. The history is viewable in MDM at any time.

How does the information get into my billing system?

The RNI creates metering data files on an hourly basis and stores those files on the server. The interface into the hourly files is achieved through the Meter Data Manager (MDM). The MDM extracts the data files from the servers and operates as the interface to the billing system. The MDM communicates to the billing system through a configurable ASCII flat text file.

Are there any outside third parties required to operate the system?

The only dependence on third parties is the data communications service connecting the TGB to the RNI. Once the utility selects the communication mode between the TGB and the RNI, the communications service provider will be responsible for installing the communications link and insuring its operation.

Do I need a special programmer for end-points?

Yes. Sensus has programming tools available to program and initiate installations.

Can I verify during installation that data transmission was successful?

Yes. FlexNet Programmers are used to initiate data transmission to the network. Since the messages are immediately sent from the TGB to the RNI, the installer has the ability to confirm data transmission was received through the MDM software.

Who is responsible for installing the FlexNet infrastructure such as the TGB, Antennae, and the RNI?

A third party contractor is hired by Sensus to perform installation of the antenna. Sensus personnel will install and configure the TGB and the RNI.

Sensus FlexNet is described as single-tier. Does this mean I will never need a repeater?

The Sensus FlexNet networks are designed to be single-tier but there are cases where Sensus may need to deploy a FlexNet Network Portal (FNP) to fill in an RF hole or out of reach endpoints.

What is a FlexNet Network Portal (FNP)?

The FNP forwards messages seamlessly to the TGB. The FNP supports mPass(Buddy) messages from the FlexNet endpoints. FNP's can be installed on utility poles or any standing structure with a 120 VAC power source.

What different transmit modes are available for the endpoints?

There are 4 available transmit modes for FlexNet endpoints. Normal, Boost, mPass (Buddy), or Tri-Mode. They are all unique in how the endpoint transmits its message to the tower.

- Normal mode: The normal transmit mode sends messages directly to the TGB.
- Boost mode: The boost transmit mode slows the baud rate of the message and thus increases the db level of the transmission which increase the chances of the message being received at the TGB. This application is used in situations where endpoints may be on the fringe area of reception. Boost mode transmit directly to the TGB
- mPass (Buddy) mode: The mPass mode allows the message to route itself through a near by FNP or a FlexNet equipped electricity meter. mPass mode is used in areas of fringe coverage or locations where the transmissions are out of range of the TGB and work through an FNP or FlexNet equipped electricity meter within range.
- Tri-Mode: The Tri-Mode transmit mode transmits using all 3 of the above modes: Normal, Boost, and mPass. This allows the FlexNet endpoint different paths to get the TGB and eliminates the need to reprogram the endpoint in separate modes.

How do I know what mode to program the endpoints?

The endpoint will be programmed into the correct mode during initiation of the transmitter. During the initiation of the transmitter, if the TGB detects a strong Signal to Noise Ratio (SNR) it will place the transmitter into Normal mode. If the TGB detects a weak SNR or doesn't hear the transmitter at all, it will be put into Tri- Mode. This allows the transmitter multiple options for transmitting and thus improving the probability of the message reaching the TGB without additional infrastructure or troubleshooting.

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