



ARB[®] FixedBase[™] AMI New Customer Guide



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New Customer Guide
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Chapter 1 Introduction

The ARB® FixedBase™ AMI New Customer Guide is designed to prepare your utility company for ARB FixedBase AMI System.

This chapter provides you with an introduction to the implementation process. It explains the focus of the guide, the pre-implementation personnel responsibilities, and general information on system support.

About This Guide

This guide provides you with basic information to help you get started with the implementation process. It is designed to be used by the Utility Manager and Billing Programmer to explain the steps that must be completed before on-site training can begin.

Typographical Conventions

Before you begin reading this guide, it is important to understand the typographical conventions used in the documentation. The following kinds of formatting in the text identify special information.

All small caps	Refers to keys Example: ENTER, ALT, TAB
All bold initial caps	Refers to field names, buttons, and functions. Example: Device field, OK button, or File menu
Lower case bold	Refers to the exact keystrokes you enter. What you type is always shown in lower case letters. Example: Type neptune in the Device field.

ARB N_SIGHT AMI Host Software Compatibility

Neptune is committed to backward compatibility with its innovative new product development.

Guaranteed Systems Compatibility

All T-10 water meters are guaranteed to be adaptable to our ProRead™ AutoDetect, E-Coder®, TRICON®/S, TRICON/E3®, and Neptune ARB FixedBase AMI System without removing the meter from service.

In addition, all Neptune ARB® Utility Management Systems™ are compatible with current production Neptune ProRead and Sensus ICE absolute encoders and legacy Neptune (ARB III-V) and Sensus (ECR II) absolute encoders.

The R450™ Meter Interface Unit (R450 MIU) is compatible with Neptune ARBV, ProRead and E-Coder encoders and Sensus ECR II and ICE (ECR III) encoders. When Neptune's E-Coder is connected to the R450, the high resolution 8-digit meter reading and E-CoderPLUS data (intermittent leak, continuous leak, reverse flow, and zero consumption) are transmitted.

Additionally, the R450 MIU is compatible with the Automated Meter Reading (AMR) Permalog leak detection sensor from Fluid Conservation Systems, Inc. (FCS) and can provide the utility with a means of detecting water leaks on distribution lines.

Project Personnel Responsibilities

Responsibilities of the Utility Manager

The following list describes the responsibilities of the Utility Manager who is the primary contact at the utility between the utility staff, the utility billing programmer, and the Neptune support staff.

- Determine the site selection and accessibility for the Neptune R450™ Data Collector (R450 DC).
- Work with Neptune in obtaining the necessary FCC license.
- Set up the General Packet Radio Service (GPRS), if applicable.

- Assess the RF 450 antenna tower access, including the power and costs of renting.
- Designate a manager for each of the following:
 - Data Project
 - Collector Installation
 - MIU Installation
- Manage the MIU installations in the most efficient way:
 - Internally
 - One route at a time
 - One zone at a time
 - Randomly.
- Determine how data will be entered into the ARB N_SIGHT AMI Host Software.
- Determine the implementation schedule to be used:
 - When to conduct the site survey
 - When to install the MIUs
 - When to install the software
 - When to train personnel.

Responsibilities of Data Project Manager

The following list describes the responsibilities of the Data Project Manager who works with the Utility Manager to effectively enter the data into the ARB N_SIGHT AMI Host Software.

- Be sure the Personal Computer (PC) that will host the ARB N_SIGHT AMI Host Software meets the requirements specified in *ARB N_SIGHT AMI Host Software Requirements* on Page 3-1.
- Create Users.
- Create Customer (one per site).
- Create Collectors.

Responsibilities of R450 Data Collector Installation Manager

The following list describes the responsibilities of the R450 Data Collector (R450 DC) Installation Manager who works with the Utility Manager and the professional installers to efficiently set up the R450 DCs for use with the ARB FixedBase AMI System.

- Know the requirements and specifications of the R450 DC as outlined in *R450 DC Specifications* on Page 3-6.
- Work with the Utility Manager in selection of the site for the R450 DCs.
- Select the professional installers for the project.
- Become very familiar with the installation guidelines and procedures outlined in the *R450 Data Collector Installation and Maintenance Guide*, Part Number 12835-001.
- Review instructions for installation with the professional installers.
- Oversee the installation of R450 DCs.
- Test the operation of the R450 DCs.

Responsibilities of MIU Installation Manager

The following list describes the responsibilities of the R450 MIU Installation Manager who works with the Utility Manager and the professional installers to efficiently set up the R450 MIUs to send and receive data from the R450 DCs.

- Know the meter requirements and specifications of the R450 MIU as outlined in *Meter Requirements* on Page 3-5.
- Perform the propagation studies for the specified area.
- Select the professional installers for the project.
- Become very familiar with the *R450 MIU Quick Install Guide*, Part Number 12856-001.

- Review instructions and procedures for installation with the installers as outlined in the *R450 MIU Installation and Maintenance Guide*, Part Number 12857-001.
- Oversee the installation of R450 DCs.
- Test each R450 MIU installed to be sure it transmits to the R450 DC.

Responsibilities of Neptune

Neptune works with the Utility Manager in obtaining the necessary FCC license. Neptune secures a license based on a frequency determined for the best coverage area and then transfers it to the utility upon request.

In addition, the Neptune Systems Implementation Specialist works with the following personnel at the utility to ensure that all aspects of the project have been successfully completed and that all required utility personnel have been properly trained on the system.

- Utility Manager
- Data Project Manager
- R450 DC Installation Manager
- R450 MIU Installation Manager

General Information

Toll-Free Customer Support

For toll-free Customer Support, please dial (800) 647-4832. Your call will be directed to the appropriate person.

Length of Software Warranty

The length of the standard software warranty is one year from the ship date unless a maintenance contract was included in the bid or original order. Please contact your local Neptune sales representative or distributor for pricing on extended maintenance agreements.

Equipment Repair

If your equipment requires repair, please contact our Customer Support representatives in order to obtain a Returned Material Authorization (RMA) number. You can reach our support representatives by calling (800) 647-4832, emailing a request to hhsupp@neptunetg.com, or faxing a request to (334) 283-7497. Please be able to describe the nature of the problem, supply a serial number, and provide a contact name and telephone number for additional information.



Any item that is returned for any reason must be accompanied by an RMA number. Any return without an RMA will be delayed in processing.

Ordering Additional Equipment

Please contact your local Neptune sales representative or distributor for prices on additional equipment. This information may also be obtained from the Customer Service Department by calling the toll free number (800) 645-1892.

Additional Training

Once your order is processed, a Neptune Systems Implementation Specialist will contact you and schedule a tentative training date. Training schedules are subject to change if implementation phases are not completed.

Additional training is offered as refresher courses. Please contact your local Neptune sales representative or distributor for pricing information.

Chapter 2 ARB FixedBase AMI System Overview

ARB FixedBase AMI System

This section on the ARB FixedBase AMI System provides you with an overview of the ARB FixedBase AMI System operations and a breakdown of the system components.

System Overview

Neptune's ARB FixedBase AMI users can get critical, timely data from the field as well as daily, system-wide, time-synchronized, midnight readings from all meters and MIUs that support leak detection and conservation initiatives. This eliminates off-cycle readings for high water-bill complaints, move-ins, or move-outs.

The ARB FixedBase AMI System also offers auto-discovery over the network allowing utilities to confirm network communications and MIU and register operation before leaving an installation site. The ARB FixedBase AMI System optimizes reading success rates through a high-power, two-way licensed transmitter that avoids collisions and interference associated with unlicensed bands. The high power also helps reduce collector infrastructure lowering total deployment costs.

The ARB FixedBase AMI System operates in the 450-470 MHz licensed frequency band protected by the FCC to ensure maximum message success rate and minimal interference. The radio messages transmitted by the R450 MIUs are received by a network of R450 Data Collectors (R450 DCs) covering the service area.

The ARB FixedBase AMI System is designed to minimize the total number of R450 DCs to ensure overall system performance and maximum message success rate.

At scheduled intervals, each R450 DC communicates the data (R450 MIU IDs, meter readings, E-CoderPLUS data, and Permalog Leak Detection data) to the ARB N_SIGHT AMI Host Software by GPRS (or other network backhaul such as Ethernet, Wi-Fi, and so forth). During this communication with the host software, the time clock internal to the R450 DC is updated, and any further instructions from the host are downloaded to the R450 DC for future action.

Components

The ARB FixedBase AMI System components include the following:

- **Host Computer** — electronically stores meter readings and other data collected by the R450 MIUs through the R450 DC.
- **ARB N_SIGHT AMI Host Software** — presents the information received from the R450 MIUs that was collected by the R450 DC into graphs and manageable representations for a utility. From this information, reports can be generated describing the accuracy in overall system health of your network.
- **R450 Data Collector** — electronically stores meter readings and other data collected by the meter reader or service technician.
- **R450 Meter Interface Unit** — transmits meter reading information from water meters to the R450 DC.

The following illustration shows how the ARB FixedBase AMI System works together.



Figure 2.1 ARB FixedBase AMI System Flow Diagram

ARB N_SIGHT AMI Host Software

ARB N_SIGHT AMI Host Software can be hosted on-site at the utility on a server specified by the Neptune Support Specialists, or the utility can elect to have ARB N_SIGHT AMI Host Software hosted through Neptune. Either way, utility personnel have full control of the advanced functionality of ARB N_SIGHT AMI Host Software 24 hours a day.

The ARB N_SIGHT AMI Host Software is a thin client Web-based application. It communicates with the file layout format as an interface for the utility's Customer Information System (CIS) for both meter reading and work order applications. Additionally, the host software supports reading performance reports and advanced usage analysis capabilities. It also has the ability to export data in Microsoft Excel, Microsoft Word, and Adobe PDF formats. The ARB N_SIGHT AMI Host Software has the basic capability of providing the following data to utilities on a daily basis for monthly billing applications:

- A daily, time-synchronized meter reading taken at midnight from all water meters for monthly billing purposes.
- 24 hourly usage/consumption readings delivered daily for resolution of customer billing disputes and improved customer service.

ARB FixedBase AMI R450 DC Units

R450 DCs are rugged, NEMA 4x weatherproof assemblies, and include a 450MHz RF transceiver, micro-processor, and AC power supply with the ARB N_SIGHT AMI Host Software and the host server. The R450 DC operates in temperature extreme ranges of -30° to 85° C. The R450 DC requires 110 VAC because of the robust two-way RF transceiver which enables the capability to take synchronized system-wide midnight meter readings and provide other value-added functionality associated with a two-way system.

ARB FixedBase AMI Wide Area Network (WAN) Options

The R450 DC can be ordered with a variety of WAN technologies to communicate with the ARB N_SIGHT AMI Host Software. The GPRS cellular modem option is standard; however, other available backhaul communication methods include Wi-Fi and Ethernet.

Table 2.1 WAN Technology Alternatives

WAN Technology	Connectivity	Transport
GPRS Wireless Data	Continuous	IP
Ethernet (Wired)	Continuous	IP
Wi-Fi (802.11)	Continuous	IP

R450 DC - Network Coverage

The ARB FixedBase AMI System is tower-based and fully optimizes the high power R450 MIU and R450 DC to effectively cover a utility's system. Prior to system deployment, Neptune conducts a detailed propagation analysis using a modeling software customized to pinpoint the best locations for the R450 DCs to ensure maximum message success rate as well as data security. One R450 DC supports several thousand R450 MIUs and multiple R450 DCs hear a single R450 MIU, providing the utility with the assurance that meter data comes through even if there is a temporary problem with individual R450 DCs.

In the case of power outages at the R450 DC, each R450 DC is equipped with non-volatile memory to prevent loss of data. In case of loss of communications between the R450 DC and the Host, the R450 DC is equipped with enough memory to allow it to continue to collect data for a minimum of three days before the data is over-written. The R450 DC communicates that data to the host server and ARB N_SIGHT AMI Host Software once power or communication is restored between the R450 DC and the host computer.

ARB FixedBase AMI - R450 Meter Interface Unit (MIU)

The R450 MIU is designed to collect meter usage data and remotely transmit the information to tower-based collectors at pre-determined intervals. The powerful R450 MIU operates within the 450 - 470 MHz FCC licensed bandwidth to ensure maximized read success rates as well as reliable RF performance. In standard mode, the MIU transmits meter usage data daily. Each meter reading is synchronized with the network and taken at midnight. The MIU uses time diversity when communicating/transmitting to the R450 DCs to maximize meter reading success rates.

The R450 MIU coupled with Neptune's solid-state E-Coder absolute encoder monitors the high, 8-digit resolution, 15-minute interval data plus the advanced functionality of E-Coder (intermittent leak, continuous leak, reverse flow, and zero usage). When the R450 identifies a critical alarm state, it is designed to notify designated utility personnel via email for immediate response. The R450 MIU can be remotely programmed from the host software for hourly profiling to address such issues as consumption disputes, conservation compliance, as well as, monitoring large commercial and industrial usage.

The R450 can be connected to two ProRead or E-Coder absolute encoder registers when the registers are configured in network mode. In addition, the R450 MIU is compatible with the AMR Permalog leak detection sensor from Fluid Conservation Systems, Inc. (FCS) and can provide the utility with a means of detecting water leaks on distribution lines.

ARB N_SIGHT AMI Host Software

The ARB N_SIGHT AMI Host Software provides the most advanced fixed network AMI functionality of any fixed-base system on the market today. Whether your information requirements are a daily read to support billing and off-cycle reads or hourly consumption and usage profile data to support customer service inquiries, ARB N_SIGHT AMI Host Software provides all of this information at your fingertips.

Neptune recognizes there is a difference between the amount of data and the value of data communicated through an ARB FixedBase AMI System. Data can be left for interpretation or displayed in a way that adds value to utility personnel. The ARB N_SIGHT AMI Host Software is designed to support key departments within your utility organization (Customer Service, Billing, and Operations) by providing high-value data in user-friendly screens and reports to help utility personnel manage their day-to-day operations. ARB N_SIGHT AMI Host Software provides users with easy system monitoring and control, over-the-air system upgrades, auto-discovery over the network, synchronized mid-night meter readings, monthly/daily/hourly customer usage graphs, enhanced reporting, priority alarms, and mapping functionality.

Account Setup

Groups, zones, and routes are used to organize the accounts in any desired manner.

- **Zones** can be geographic – North, South, East, or West
- **Groups** can be anything such as industrial, commercial, or residential. Examples include the following:
 - Hotels, hospitals, apartments, restaurants
 - Stores such as Wal-Mart
- **Routes** can be the billing routes from the CIS.

To set up groups, zones, and routes for your accounts, use the Table Maintenance function located on the System Maintenance tab with the ARB N_SIGHT AMI Host Software.



For more information and the steps on how to set up your account, press F1 while using the ARB N_SIGHT AMI Host Software to view the *ARB N_SIGHT AMI Online Help*.

General Terminology and Explanation

Standard Industry Terms

Before proceeding, note these standard industry terms. They are used in the subsequent section.

Term	Description
AMR	Automatic Meter Reading. The automated process of reading meters.
EMR	Electronic Meter Reading. Similar to AMR.

Header Record	The information at the top of an import or export file which designates the beginning of a route. This record contains basic route related information such as the cycle number, route number, survey information, start/end date and times, reader ID, totals, and vehicle information. Optional headers may be included in the import file for broadcast and route messages.
Host Software	The ARB N_SIGHT AMI Host Software resides on a server. The application can be accessed through a Web browser from PCs within the network.
Meter	A device that measures a resource. Many utility companies use the term "meter" to refer to a set of readings.
R450	Neptune's two-way Radio Frequency transmitter that broadcasts an MIU ID and the meter reading from a Neptune encoder or Invensys ECR II and III register.

ARB FixedBase AMI Terms

The following is a list of terms that can be helpful for the ARB FixedBase AMI System.

Term	Description	Example
System ID	Unique system-wide number for a given utility to compartmentalize co-located collectors into virtual "groups"	101 (ABC Utility) 102 (Anytown) 104 (Metropolis)
Customer Number	Unique identifier for customer using zip code for utility	48329 (Anytown, AL)
Collector Number	Sequential number of collector for a given Customer Number	12
Collector ID	A unique, sequential description of collector for a given utility	48329_0012 (Anytown 12)
Customer Special Number	Neptune-assigned unique manufacturing special number used with part numbers. Special refers to the System ID and the frequencies for the customer.	SXXX

Chapter 3 Customer Requirements

This section describes the ARB N_SIGHT AMI Host Software requirements.

ARB N_SIGHT AMI Host Software Requirements

The ARB N_SIGHT AMI Host Software supplies all the control needed in the network and provides the essential functions of network management, meter communications, reporting, database configuration, and alarms monitoring. It complies with prevailing industry standards and should run on a Windows compatible PC. The ARB N_SIGHT AMI Host Software can be an interface with handheld and mobile meter reading software to enable a hybrid meter reading approach. The ARB N_SIGHT AMI Host Software communicates to the utility's CIS billing software through the ARB N_SIGHT AMR Host Software. The meter reading data communicated to the CIS system is provided in an American Standard Code for Information Interchange (ASCII) flat-file format.

System Requirements – Client PC Specifications

The following list describes the minimum requirements for the Client Personal Computer (PC).

- Microsoft Windows XP® Professional/Windows 7 Professional (32 or 64 bit)
- Intel Core 2 Duo 2-gigahertz (GHz) processor or faster
- At least 2 Gigabytes (GB) of Random Access Memory (RAM) – 4GB is recommended

To determine your processor speed and amount of RAM your computer has, do one of the following:

- Choose **Start | Control Panel | Performance and Maintenance | System.**
- Choose **Start | Settings | Control Panel | System**

The General tab of the System Properties dialog shows the memory in your system.

- At least 1.5 GB of available space on the hard disk
- Keyboard and Microsoft Mouse or some other compatible pointing device
- For networking: Network adapter appropriate for the type of local-area, wide-area, wireless, or home network to be connected to and access to an appropriate network infrastructure; access to third-party networks may require additional charges
- Minimum one USB port
- CD-ROM drive
- Video adapter and monitor with Super VGA (1024 X 768) (Higher resolution is recommended)
- FTP Access (recommended) type of local-area, wide-area, wireless, or home network you wish to connect to, and access to an appropriate network infrastructure; access to third-party networks may require additional charges
- Broadband Internet connection (1.5Mbps minimum)

System Requirements – Server Specifications

Table 3.1 on Page 3-3 describes the minimum recommendation for server installation.

Table 3.1 Server Specifications

Number of Services	0-10,000	10,000-50,000	50,000-100-000
Operating System	Server 2008 R2	Server 2008 R2	Server 2008 R2
Processor	Xeon X56xx Series	2x Xeon X56xx Series (min)	2x Xeon X74xx Series (min) (Recommend 4x)
RAM	16 GB	32 GB	64 GB
Hard Drive Size (usable)			
• OS (Partitioned)	100 GB	100 GB	100 GB
• Database/backups	900 GB	1.9 TB	5.9 TB
Disk Controller	RAID 5 (Rec. RAID10)	RAID 5 (15k RPM) (Rec. RAID10)	RAID 5 (15k RPM) (Rec. RAID10)
Network Adapter	Yes - gigabit	Yes - gigabit	Yes - gigabit (dual recommended)
DVD-Rom Drive	Yes	Yes	Yes
Power Supply	Redundant	Redundant	Redundant

- Hard Drive Type: RAID* Recommended
- Email capability for sending and receiving email messages.

*Information Requirements

In addition to obtaining the meter reading from an MIU, the R450 Data Collector (R450 DC), and ARB N_SIGHT AMI Host Software, the system supports the following information requirements:

- Stores additional meter readings and status flag information from other monitoring devices (such as distribution line leak noise loggers)
- Supports single and dual register meters
- Supports meter readings of four to eight digits and MIU ID numbers up to 10 digits
- Supports Neptune E-CoderPLUS output information

- ☑ Interfaces with Neptune's ARB N_SIGHT AMR Host Software application to support hybrid system operation
- ☑ Supports GPS type data to identify locations of account graphically
- ☑ Has the capability to store all meter data information obtained from the R450 DCs for a minimum of two years
- ☑ With the R450 DCs, can retain the past three rolling days of collected meter data in the case of a power outage or interruption in the communication link with the software
- ☑ Monitors the status of the WAN and alerts the user in the event of a problem impacting communication between the R450 DCs and ARB N_SIGHT AMI Host Software (for example, the server receiving alarm information for major reverse flow, and so forth)
- ☑ Has the capability to monitor MIUs that have transmitted for the first time to identify successful installation and operation
- ☑ In conjunction with the supplier, provides the service of remotely monitoring the system and has controls in place to ensure optimized system operation
- ☑ Has the capability to monitor status/performance of the R450 DC units in the network
- ☑ Provides diagnostics so that operators can evaluate performance and send instructions over the air to optimize performance of the R450 DCs and the network

Additional System Requirements and Specifications

Meter Requirements

The R450 MIU works with Neptune ARB V, ProRead, E-Coder, and Sensus ECR II & ECR III.

E-Coder	An electronic digital encoder register that has a Proprietary integrated circuit that provides absolute registration with no internal battery requirement. The E-Coder functions in two modes: E-Coder BASIC and E-CoderPLUS. The E-Coder BASIC mode functionality is the same as ProRead (ARB VI) featuring programmability up to a 10-digit ID number, three user characters and 3- to 6-digit meter reading. When connected to Neptune's R450 fixed network MIU and to an R900v2 or higher radio, the E-Coder operates in E-CoderPLUS mode.
R450 MIU	ARB FixedBase AMI RF transmitters for water meters. ID numbers are unique nine-digit numbers.
R450 Data Collector	Receives, stores, and communicates meter reading data to the ARB N_SIGHT AMI Host Software in the host computer. The R450 DC collects this data from Neptune's R450 MIU interfacing with Neptune's absolute encoder register. This data can later be uploaded to the CIS and sent to the utility billing system for processing. The R450 DC utilizes frequencies in the 450-470 MHz licensed band. An FCC license is required prior to installation.

R450 DC Specifications

Electrical Specifications

AC Power 120V AC, 1.0A, 60Hz

Environmental Conditions

Operating Temperature¹ -22° to 140°F (-30° to 60°C)

Storage Temperature -40° to 185°F (-40° to 85°C)

Operating Humidity 0 to 95% Non-condensing

Environmental Rating UL50E Type 4X

Operating Altitude Less than 6561 feet (2000 metres)

¹For installations that have ambient temperatures that exceed 110° F (43.3° C), the R450 DC must be installed in a well-ventilated, shaded location.

Mechanical Specifications

Maximum Weight 71.5 pounds
32.5 Kg

R450 DC Footprint

R450 Data Collector 8' X 8' Triangle
Stand (Valmont) 2.4M X 2.4M Triangle

Safety Approval

UL Listed Per 60950-1

CSA C22.2 No. 60950-1

Customer Requirements

Server/System Setup and Specifications

The Neptune ARB FixedBase AMI System operates on a client/server system. The server usually resides in the utility office and the client software resides on desktop PCs throughout the utility.

The server hosting the database requires a static Internet Protocol (IP) address in order for the R450 DCs to be able to synchronize with the database. The IP address is coded into each R450 DC in the system.

The servers are usually located in a Demilitarized Zone (DMZ) portion of the network to isolate them from the rest of your network. The GPRS R450 DCs synchronize with the server from public IP addresses.

R450 DCs that use an Ethernet connection are part of utility's internal network and may not require the use of a DMZ. (See Figure 3.1.)

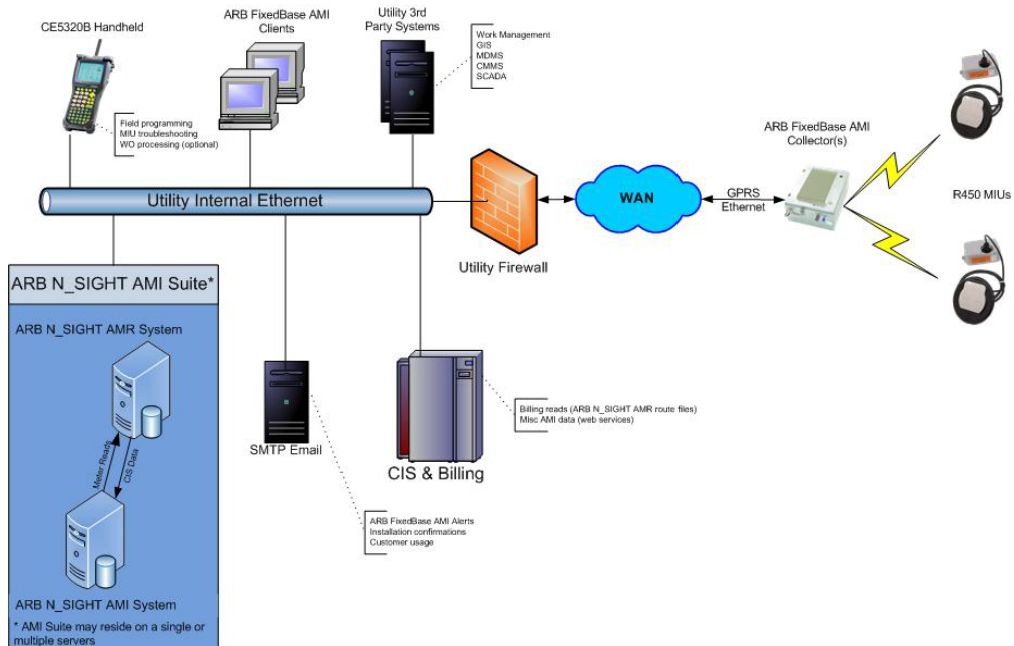


Figure 3.1 ARB FixedBase AMI Network

For the complete specifications for the server, refer to *System Requirements – Server Specifications* on Page 3-2.

Small Mail Transfer Protocol (SMTP) for Emails

A key component of the ARB FixedBase AMI System is the ability to send out emails for a wide range of applications:

- Configuration packets for the installers – either emails or Short Message Service (SMS) text messages
- Alarms from the meters for leaks, backflows, and so forth
- Consumption graphs from the Customer Service pages

ARB N_SIGHT AMI needs to connect to the utility's SMTP mail server in order to be able to send the emails and Short Message Service (SMS) messages.

Remote Access

To provide technical support and ongoing maintenance, Neptune Customer Support personnel require remote access to the server. This can be achieved in many different manners - the choice is up to the utility. This access can take the form of the following:

- Direct remote terminal access
- Virtual Private Network (VPN) direct connection
- Web-based remote access programs, for example, GoToMY PC
- Web-based remote access programs that require utility involvement, for example, GoTo Meeting

The Neptune Systems Implementation Specialist can discuss the various options with you.

GPRS Requirements, if Applicable

R450 DCs using a GPRS modem require access to a GPRS network. The utility needs to arrange for the GPRS service with an unlimited data plan and acquire a Subscriber Identity Module (SIM) card. One SIM card is required for each R450 DC.

To connect to the GPRS network, the cellular company provides the connection name and a system password. This information is programmed into the modem of the R450 DCs during the installation process. The R450 DCs can then synchronize to the database using the public internet.

GPRS Considerations

The following list discusses considerations when using GPRS:

- The GPRS cellular modem option is standard; however, other available backhaul communications methods include Wi-Fi and Ethernet.
- All proposed R450 DC sites must have access to electrical power and either a GPRS or a TCP/IP communication link to send messages to the ARB N_SIGHT AMI Host Software.
- The GPRS customer must arrange for service prior to installation.



The GPRS modem requires a SIM card which must be ordered separately. Obtain the SIM card from the GPRS service carrier. For a list of GPRS carriers, go to <http://www.sierrawireless.com/support>.

Ethernet Requirements

The R450 DC Ethernet system uses AC-power in conjunction with an Ethernet option. Because the Ethernet option is used indoors only, usually the R450 DC is mounted on a wall.



There must be Ethernet access at the site.

Ethernet Considerations

R450 DCs using Ethernet connections do not require special programming. When they are connected to the network, they acquire an address and start synchronization with the host database.

Notes:

Chapter 4 Implementation Steps for ARB FixedBase AMI

This chapter explains in detail the steps needed to prepare for ARB FixedBase AMI implementation. It is also designed to be used as a checklist to monitor the progress of your implementation until its completion. Steps 1 through 4 and 6 are to be completed by the utility, and Step 5 is to be completed by Neptune.

Step One: Prior to Implementation

Prior to installing your ARB FixedBase AMI System, the following pre-installation activities are required:

- Provide a list of the meter locations (address or GPS coordinates)
- Provide address and tower specifications for tower sites
- Assist with discussions/negotiations with the owners to gain access for the R450 Data Collector (R450 DC) installations, if buildings or other non-city-owned sites or towers are suggested as the best locations for R450 DCs to be installed
- Secure cellular service contracts for each R450 DC (if Ethernet is available at tower sites, this is not necessary)
- Assist with installation of server on site at utility office
- Provide access through utility firewall for system monitoring and diagnostic work at Neptune
- Assist with documentation to allow Neptune to transfer the FCC license secured by Neptune for the city to the city

Step Two: Customer Profile Sheet

An ARB FixedBase AMI Customer Profile Form should be completed to provide the required information to Customer Support to complete a propagation study and conduct an initial FCC frequency review. An Order Checklist Form is available to define the R450 DC and R450 MIU requirements and can be used to complete the Purchase Order accurately with the correct part numbers. A sample of this form is included in Appendix A.

The FCC frequencies and license for the service area must be secured prior to order entry.

The Utility Manager needs to provide customer profile information for the ARB N_SIGHT AMI Host Software. This information includes the following:

- Names of the R450 DCs
- R450 DC profile
- Configuration addresses
- Records of customers with their account and meter information.



In order for your ARB FixedBase AMI System to work in the most efficient way, the information contained on the Customer Profile Sheet is critical to the implementation of ARB FixedBase AMI. Allow ample time to complete this step.

- In addition, the Utility Manager completes the site detail section of the Propagation Analysis Request Form, supplying requested details for the endpoint locations and proposed sites where the R450 DCs are to be installed.

Step Three: Install and Power the R450 DCs

Neptune works with the R450 DC Installation Manager to ensure the proper installation of the R450 DCs. For proper installation procedures, please consult the *R450 Data Collector Installation and Maintenance Guide*, Part Number 12835-001. Once installed, the R450 DC Installation Manager needs to turn on the power for the R450 DCs to verify transmission of data.

Neptune works with the R450 MIU Installation Manager to ensure the proper installation of the R450 MIUs. The R450 DC Installation Manager works with the R450 MIU Installation Manager to be sure that the R450 MIUs are transmitting and receiving data with the R450 DCs. At least one R450 MIU must be installed before an R450 DC can be tested for transmission.

If the installation goes as described, small dots appear on the bottom graph of the ARB N_SIGHT AMI System Health page. The host software indicates whether the R450 DC is receiving information from the MIU. The installer swipes an MIU to see if communications are connected, and if the MIU can transmit and receive with the R450 DC.



At least one R450 MIU must be installed in order to test the power of the R450 DC.

Step Four: Schedule Training

Although onsite training dates can be scheduled in advance, steps 1-3 need to be completed before training takes place. Any delays in these steps may postpone training dates.

When requesting training, please provide at least a 60-day notice in advance of the desired dates to allow for preparation. For available training dates and to schedule training, please contact your assigned Systems Implementation Specialist at (800) 647-4832.

Step Five: Onsite System Training

The ARB FixedBase AMI System Training is composed of two segments: Software Training and Customer Service Personnel Training. The software training involves the System Operator, usually the office manager or the second person in charge. The training for the Customer Service Personnel includes those persons who are servicing the utility. The duration of this training depends on the size and complexity of the installation and the number of employees to be trained.

The following list describes the various topics to be discussed during training for both the System Operator and the Customer Service Personnel. Please review these items and contact your Systems Implementation Specialist at (800) 647-4832 if you have any questions.

ARB N_SIGHT AMI Training for System Operator

- Setting up the ARB N_SIGHT AMI Host Software
- Setting up DCs and MIUs in the system
- Setting of alarms and commands
- Generating reports
- Administrative functions
- Maintaining the system

Customer Service Personnel Training

- How to interpret data in ARB N_SIGHT AMI Host Software
- How to troubleshoot potential problems
- How to resolve problems that occur

Step Six: Implementation of Data

Neptune works with the Data Project Manager along with the Utility Manager to effectively enter the data into the ARB N_SIGHT AMI Host Software.

- Entering data into ARB N_SIGHT AMI
- Importing route data
- Handling found meters for which there are no meter or premise records
- General maintenance

Forms Required

The following forms are required prior to implementation. Sample forms are provided in Appendices A and B.

- Customer Profile Form
- Propagation Analysis Form

Onsite Visits

Refer to the following information for visits from the Neptune System Implementation Specialist.

- **First site visit:** Neptune is on site for first R450 DC installation, configuration and synchronization, testing MIU communication to R450 DC, preliminary demonstration and overview of the host software.
- **Second site visit:** This visit covers the MIU Installation Training for installation crews; it also includes ARB N_SIGHT AMI Host Software training.

Followup Monitoring

Neptune Customer Support begins initial monitoring after the MIU installations. For more information on product support, refer to *Toll-Free Customer Support* on Page 1-5.

Notes:

Chapter 5 Propagation Analysis

A propagation study helps in the deployment planning for your ARB FixedBase AMI System. Reliable transmission range is crucial to the operation of a properly designed network. Neptune 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 the R450 DCs. Once the modeling is complete, a proposal is discussed with the utility outlining implementation and infrastructure requirements.

This chapter explains in detail the steps needed to prepare for the propagation analysis and how this helps your initial site visit by Neptune's Implementation Specialist.

- **Propagation Analysis Request Form** — includes electronic list of customers, suggested antenna location details, and environmental factors. It also includes other site detail information, such as, other RF systems used by utility and antenna location details. See Figure B.1 on Page Appendix B-2.
- **ARB FixedBase AMI Project Application Form (Customer Profile Form)** — includes contact information for Utility Project Manager, IT, installation crews, and fixed base configuration. Refer to the Figure A.1 on Page Appendix A-2.
- **Propagation Study Results and Customer Presentation** — includes color-coded map of areas with good, marginal, and no coverage, suggested number of R450 DCs.
- **FCC Approval** — includes applying for the license. The Neptune ARB FixedBase AMI System operates on a licensed frequency in the 450 to 470 MHz band. Approval is granted by the FCC or

Industry Canada and includes searches for available frequencies and the application.



Systems located near the border require approval from both countries, and as a result, the process can take longer.

Propagation Analysis

The Propagation Analysis Request Form includes an electronic list of customers, suggested antenna and DC location details, and environmental factors. The following list describes the main characteristics of a propagation analysis.

- Preliminary look at the utility account area to determine the extent of ARB FixedBase AMI coverage
- Includes terrain characteristics, land usage, customer meter locations, and antenna sites
- Provides predicted coverage areas

The propagation analysis involves the following:

- Completing the Propagation Analysis Request Form
- Providing an electronic list of customers
- Recommending or suggesting antenna locations (including heights)
- Providing details on what other 450 MHz equipment is mounted on the antenna site, for example, SCADA; can potentially affect system performance
- Finding out other RF systems used by the utility to minimize interference
- Seeking information for the antenna location. Antenna location can be important on a tower



Refer to Figure B.1 on page Appendix B-2 for an example of the Propagation Analysis Request Form.

After the Form is Completed

The following list describes what happens after the propagation analysis form is completed.

- Addresses are geocoded for latitudes and longitudes
- Terrain data is downloaded
- Map is created with street information
- Clutter (land use) data is selected
- Data is loaded into the propagation analysis software
- Antennas are located
- Calculations and analysis are performed

FCC Licensing

The ARB FixedBase AMI System components are approved by the FCC as Part 90 components and must operate under an FCC license (due to the high power transmitter). Neptune secures the FCC license based on a frequency determined to be the best for the coverage area and transfers the license to the utility upon request.

Neptune utilizes a legal firm that specializes in application submission and procurement of FCC licenses for approved frequencies. Neptune provides this service to the customer free of charge. This process usually takes four weeks from the time the necessary information is compiled to complete the application. When the project award is made to Neptune, Neptune works with the utility to obtain the appropriate authorization to have the license transferred to the utility. The utility is responsible for future renewals of the license (every three years). The renewal fees are usually less than \$100.

Notes:

Chapter 6 CIS/ARB N_SIGHT AMR Interaction

CIS and ARB N_SIGHT AMI

The CIS and the ARB N_SIGHT AMI Host Software interact through ARB N_SIGHT AMR. For billing purposes, the route information is imported into ARB N_SIGHT AMR. Readings from the ARB N_SIGHT AMI Host Software are pulled and posted in the appropriate accounts. The balance of the routes can then be loaded onto a mobile device (handheld or vehicle-based unit) to capture the remaining unread accounts. The completed route (combination of fixed and mobile) is then exported back to the CIS for billing. ARB N_SIGHT AMI is used for collecting and monitoring daily reads and customer profile data. ARB N_SIGHT AMR is used for managing the monthly billing cycle.

Number of Dials

ARB N_SIGHT AMI Host Software captures 8-digit readings (reflecting the higher resolution of the E-Coder). Readings from ARB V and ProRead encoders are padded with trailing zeros to fill the eight digits. For example, a two-board ARB V register reading of 1234 becomes 12340000 in the ARB N_SIGHT AMI Host Software. There are settings in the ARB N_SIGHT AMI Host Software that allow the number of dials displayed to be eight or less. The reading is adjusted to the number of dials if the Adjust R900 Dials option is set when the reading is pulled into ARB N_SIGHT AMI.

Pulling Reads

Within ARB N_SIGHT AMR in the handheld section, highlight the selected routes from which you want to obtain readings. Selecting Extract Fixed Network reads sends the list of MIU IDs to the ARB N_SIGHT AMI Host Software. Any IDs that match the ARB N_SIGHT AMI database are populated with the latest reading (within the last three days).

Pushing Data

Account data (meter numbers, MIU IDs, names, addresses, latitudes, longitudes, and so forth) can be exported from a route in the ARB N_SIGHT AMR database to the ARB N_SIGHT AMI database by using a standalone utility. Only accounts with a nine-digit MIU ID numbers are exported. This saves the effort of having to enter the account data again into the ARB N_SIGHT AMI database.



For more information and the steps on how to perform these tasks, press **F1** while using the ARB N_SIGHT AMR Host Software to view the *ARB N_SIGHT AMR Online Help*.

Appendix A Required Form

One Required Form

Only one form, the ARB FixedBase AMI Customer Profile Form, is required prior to implementing an ARB FixedBase AMI System. A sample form is illustrated in Figure A.1 on Page Appendix A-2

ARB® FixedBase™ AMI

ARB® FIXEDBASE™ AMI CUSTOMER PROFILE

UTILITY INFORMATION

Utility:		Customer ID:	
Ticket Number:		System ID:	
Primary Contact Name:			
Address 1:			
Address 2:			
City:	Province/State:	Postal/Zip Code:	
Tel:	Fax:		
Email:			
TM:	RSM:		
Distributor:		Contact:	

FCC LICENSE APPLICATION REQUEST NOT REQUIRED/EXISTING

Completed by:	Phone #:
Requested Date:	Date Form Completed:

CUSTOMER/FCC LICENSE CONTACT INFO

Contact Name:	Utility Name:
Address:	City:
State/Province:	Postal/Zip Code:

SERVER DATA BASE

Who is Hosting Data base: <input type="checkbox"/> Customer <input type="checkbox"/> Other (Specify)
IT Contact Name:
Company:
Tel:
Email:

ANTENNA & COLLECTOR INSTALLATION

Utility: <input type="checkbox"/> Contractor: <input type="checkbox"/>	
Contact Name:	Email:
Company:	Phone:
Address:	City: State/Province:

FN COLLECTOR CONFIGURATION **PART NUMBER: (select)**

Qty Proposed:	Modem Type: (pick one)	GPRS Service: <input type="checkbox"/> Yes <input type="checkbox"/> No
Receive Frequency: MHz	Service Provider:	
Transmit Frequency: MHz	Mounting Config: (pick one)	

R450™ MIU CONFIGURATION

Estimated MIU Quantities: Pit Type		Wall Type	
Receive Frequency: MHz	Transmit Frequency: MHz		

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Figure A.1 Sample Customer Profile Form

Appendix B Propagation Analysis Request Form

The Propagation Analysis Request Form includes an electronic list of customers, suggested antenna location details, and environmental factors. Take a preliminary look at the utility account area to determine the extent of ARB FixedBase AMI coverage.

The following figure provides an illustration of a Sample Propagation Analysis Request Form used by Neptune to conduct the propagation study prior to the implementation of ARB FixedBase AMI.

ARB[®] FixedBase

NEPTUNE ARB[®] FIXEDBASE[™] PROPAGATION ANALYSIS REQUEST

Email: propagationrequest@neptunetq.com

R450[™] System Request (ARB[®] FixedBase[™] AMI)
 R900[®] Gateway System Request (ARB[®] FixedBase[™] AMR)

UTILITY INFORMATION

Utility:		Territory Manager:	
Primary Contact Name:		Regional Manager:	
Address 1:			
Address 2:			
City:	State/Province:	Zip/Postal Code:	
Telephone Number:	Fax Number:		
Email Address:			
Distributor:		Contact Name:	

PURPOSE FOR REQUEST

<input type="checkbox"/> Required for an RFP Response	RFP due date:
<input type="checkbox"/> Required for an RFI/RFQ Response	RFI/RFQ due date:
<input type="checkbox"/> Required for a critical, decision-making presentation	Date of scheduled presentation:
<input type="checkbox"/> Required for a pilot project implementation	*Date Required:
<input type="checkbox"/> Required for a firm, project proposal/quotation	*Date Required:
<input type="checkbox"/> Required for a budgetary estimate	*Date Required:
Date of Request:	* denotes latest, acceptable date is required

CUSTOMER INFORMATION

Number of Connected Services:	List of Customers/Accounts attached? <input type="checkbox"/> Yes <input type="checkbox"/> No
* Spreadsheet or text document with addresses must be electronic Note: Prefer to have latitudes & longitudes File Formats: EXCEL, TXT, CSV, DBF, ESRI Shape file(SHP), AutoCAD(DXF), MAPINFO(MIF,TAB)	

MIU CONFIGURATION

Wall Type: <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Outside (preferred), <input type="checkbox"/> Inside (above grade), <input type="checkbox"/> Inside (below grade)
Pit Type: <input type="checkbox"/> Yes <input type="checkbox"/> No	Lid type: <input type="checkbox"/> Plastic <input type="checkbox"/> Metal
If a mixture of Wall & Pit Types: _____ % Wall _____ % Pit	
Existing R900 versions: <input type="checkbox"/> V1 _____ %; <input type="checkbox"/> V2 _____ %; <input type="checkbox"/> V3 _____ %; <input type="checkbox"/> R900i _____ %	
Note: All R900i Gateway studies require approval from RM and DOS prior to being run.	

ANTENNA LOCATIONS (ATTACH SPREADSHEET OR TEXT DOCUMENT)

Water Towers Available: <input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, provide location details & heights on form below.
Other Tower/Structure Sites Available: <input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, provide location details & heights on form below.
Is permitting required for antenna installation <input type="checkbox"/> Yes <input type="checkbox"/> No	Name of Permitting Authority:
Are there height or wind restrictions <input type="checkbox"/> Yes <input type="checkbox"/> No	Please attach guidelines or link
Locations must include specific site detail information. See Below	

COORDINATE FORMAT: (ANTENNA AND/OR METER FILES)

Type: <input type="checkbox"/> Latitude/Longitude <input type="checkbox"/> State Plane(SPCS) <input type="checkbox"/> UTM	SPCS/UTM Zone:
Datum: <input type="checkbox"/> NAD83 <input type="checkbox"/> WGS84 <input type="checkbox"/> NAD27 <input type="checkbox"/> Other:	SPCS/UTM units: <input type="checkbox"/> Feet <input type="checkbox"/> Meters

PROPAGATION REQUEST FORM 3.0 9/22/2011

Figure B.1 Sample Propagation Analysis Page 1

ARB[®] FixedBase

DATA COLLECTOR SITE DETAIL INFORMATION (AVAILABLE LOCATIONS)

SITE	ADDRESS (DESCRIPTION, INTERSECTION)	LAT (N)	LONG (W)	STRUCTURE TYPE	STRUCTURE HEIGHT (M)	PROPOSED ANT HGT (M)	GROUND ELEV. (M)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DATA COLLECTOR SITE DETAIL INFORMATION (AVAILABLE LOCATIONS)

SITE	PROPOSED D.C. MOUNTING LOCATION (SHELTER, POLE, BUILDING, ROOF, ETC.)	COAX LENGTH	BACKHAUL *(G, E, W,O)	POWER (110V)	CITY	COUNTY	STATE
**1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

* INDICATES EITHER GPRS, ETHERNET, WIFI OR OTHER BACKHAUL OPTION IS DESIRABLE

** INDICATES THAT SITE NUMBER CORRESPONDS WITH PHYSICAL ADDRESS LOCATIONS LISTED ABOVE

WAN Service provider (if known):

KNOWN RF SYSTEMS ON ABOVE SITES: (SCADA, WIRELESS, 2 WAY, ETC)

SITE	SYSTEM FREQUENCY(IES)	SYSTEM ANTENNA HEIGHT	SYSTEM ERP (W)	OTHER INFO (EQUIPMENT TYPE, ETC)
**1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

If available, provide map/diagram of antenna locations on tower.

Note: Adjacent antennas may impede system performance.

Email: propagationrequest@neptunetg.com

Figure B.2 Sample Propagation Analysis Page 2

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