



# DISTRICT METERED AREAS, MASS BALANCING, AND SYNCHRONIZED MIDNIGHT READS

It seems simple: A utility pumps a certain amount of water, and its customers pay a certain corresponding amount for their use of that water. However, a lot can happen to the water on the way; leaks on residential supply lines, stopped or inaccurate meters, unauthorized consumption, and leaks on distribution mains can turn it into Non-Revenue Water.

Utilities now have a tool that will enable them to become more proactive in the fight to conserve a precious resource and recover revenue. Using time-synchronized midnight meter reading, a utility can determine the total consumption for any given group of meters within a district or "area." These District Metered Areas (DMAs) also make it easy to mass balance an entire system's water pumped versus water billed, where the total consumption is compared to a master or "bulk" meter(s) servicing the area. Districts with a large discrepancy between the total consumption and the respective master meter(s) indicate potential distribution system leaks within that particular area. DMA analysis helps to identify water losses both on the service line as well as pinpoint problems along the utility's distribution system – down to the neighborhood level.

The key to DMA monitoring is system-wide, time-synchronized meter reading. As part of a two-way, Advanced Metering Infrastructure (AMI) system, this ability to take a precise snapshot in time of the entire meter population goes a long way to recapturing Non-Revenue Water. It's a unique new tool, but it's already yielding dividends for utilities using Neptune's ARB® FixedBase™ System based on R450™ technology. For the first time, it's possible to compare meter to meter and calculate total consumption – on a daily basis.

## THE VALUE OF PRECISE TIME SYNCHRONIZATION

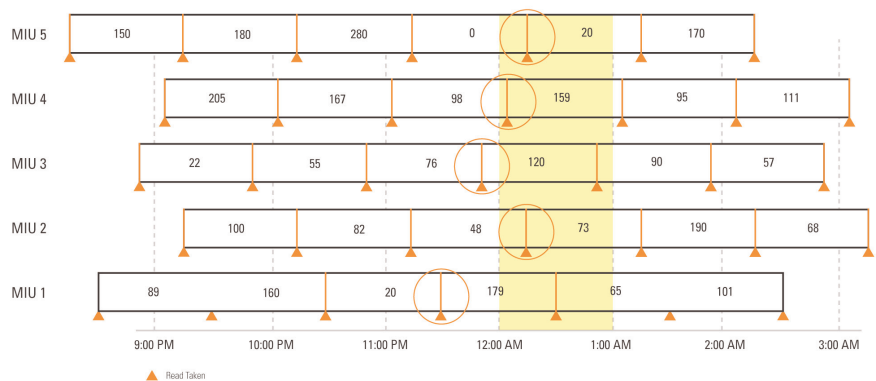
It's only by synchronizing meter reads that a true comparison can be made. Without this synchronization, all of the utility's meters would deliver their reads and data at various times throughout a 24-hour cycle. One read would come in at 4:30 a.m. Another at 8:10 a.m. Another at 2:45 p.m. And so on. It's like trying to hit a moving target to get an idea of what's happening across the whole meter population at any given time. But by comparing "apples to apples," so to speak, and reading every meter at midnight, the utility can see the total picture, including each consumer's usage. The only way to compare the consumption of two meters – or groups of meters – is for their consumption to be on the same synchronized time basis. In the case of ARB FixedBase, that means midnight.

These synchronized meter reads are possible due to the fully two-way communication that allows meter interface units (MIUs) with transceivers not only to initiate signals back to the collector and then back to the host software,

but to receive them as well – this includes daily time synchronization (to ensure time accuracy within the MIU) and remote programming.

When consumers inquire about a high water bill, they may not understand how much a single leak may add to what they owe. That's where historical consumption graphs – hourly, daily, or monthly – prove useful. The ARB FixedBase System provides 24 one-hour consumption intervals on a daily basis to determine exactly when end users are using water. Customer complaints about high water bills can now be resolved more expediently with the ARB FixedBase System's capability to email customers' usage graphs that profile their water consumption, identifying leak situations as well as when actual water consumption occurred.

Together with time-synchronized meter reads, 24 one-hour consumption intervals allow utilities to easily and effectively monitor usage restriction programs (such as odd- or even-day usage) to further reinforce the



Example of five MIUs in a six-hour window

importance of water conservation. And for more time-sensitive issues, utilities using the R450 radio frequency MIU connected to Neptune's E-Coder® can monitor 15-minute interval flags for leak, tamper, and reverse flow detection. So, for example, this detailed usage data means the resident who tries to disable or tamper with a meter to disguise excessive water consumption will more easily – and more quickly – be identified so corrective action can be taken.

It isn't just residential consumers whose use can be tracked. Hourly consumption and correct meter sizing for Institutional, Commercial, and Industrial (IC) users can also be monitored by exact time period using time-synchronized midnight meter reads and 24 one-hour consumption intervals. If need be, a utility can now make an informed decision to resize a meter for a specific application. Knowing when hourly consumption reaches its highest levels also gives utilities the ability to enforce water use restrictions on high-revenue users to manage supply. In addition, accurate hourly

consumption data supports Time of Use (TOU) billing schedules allowing utilities to better manage their resources and maximize revenue.

### **DISSEMINATING CRITICAL INFORMATION THROUGH PRIORITY ALARMS**

Using the ARB FixedBase System's secure two-way communication (FCC licensed 450MHz band) from the host software to the R450 RF MIU, a utility can remotely configure the MIU for priority alarms when specific conditions occur at the meter source and along water distribution lines. In this mode, when predefined flow parameters are met, an MIU will override its scheduled transmission time and immediately communicate the alarm condition across the two-way network. The utility can configure its system so that a critical alarm situation such as a 24-hour continuous leak or a major reverse flow event will automatically send out an email or text message to critical utility staff, who then can quickly address the situation by dispatching maintenance personnel.

Like the consumer side of a system, so too the distribution side must be carefully monitored. Working together, Neptune's two-way ARB FixedBase System and AMR Permalog® acoustic noise leak monitoring devices can detect leaks in the distribution system. With early notification of distribution main leaks, utilities can take a proactive approach to these conditions and repair these leaks, even preventing distribution main breaks with their potential loss of millions of gallons of water.

Leaks on residential supply lines, stopped or inaccurate meters, unauthorized consumption, leaks on distribution mains – there are a number of common sources of Non-Revenue Water. All of these conditions can be monitored daily using the ARB FixedBase System, with priority alarms ready to help address critical situations. When it comes to being more proactive for water conservation, enhanced customer service, and improved overall operational efficiencies, it all comes down to timing – something synchronized midnight meter readings improve exponentially. 📡