INTRODUCTION TO THE DA DEVELOPMENT KIT

Introduction

Itron offers a communications platform that can support multiple applications. One such application is Distribution Automation (DA), providing communications to distribution network devices such as switches, reclosers, line sensors, fault indicators, transformer monitors and capacitor-bank controllers.

For high value assets like switches and reclosers, Itron supplies a hardware device known as a Remote Bridge. This is a standalone device that can be readily installed within a control box and interface to the controller using serial or Ethernet.

Itron also has a number of Communications Modules of different form factors that are typically embedded directly into electricity meters. For lower cost and higher volume DA assets, this can be a more cost effective solution than utilizing a Remote Bridge. Furthermore, in some applications, for example an inductively powered lined sensor, power and space constraints don't allow the use of a Remote Bridge.

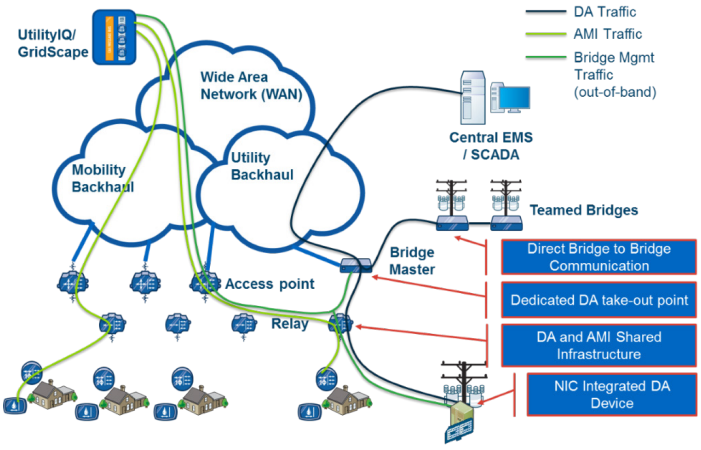
NETWORK ARCHITECTURE

The typical DA network architecture is shown in Figure 1. DA/SCADA traffic flows are shown in dark blue, going from the endpoint (e.g. NIC integrated DA device) via other Remote Bridges and Relays to a Master Bridge. The Master Bridge provides the gateway between the RF mesh and the backhaul network, and is typically installed at a substation with IP backhaul. SCADA traffic is then transported across the utility's backhaul network to the SCADA/DMS/EMS system. The Bridges and DA NIC can be configured with either IPv4 or IPv6 addresses.

Figure 1: DA and AMI Network Topology

Device management traffic is shown in dark green. This includes collection of statistics, managing configuration, firmware, etc. This traffic typically follows a different path and exits the mesh at an Access Point and uses a different backhaul network to get back to the back office software. This software includes UIQ (primarily for metering) and GridScape (primarily for DA devices).

Other network architectures are possible. As an example it is possible to have so called "In-band-monitoring" where the Device management traffic flows through the Master Bridge. This is often used for DA only customers. Please consult with Itron personnel to discuss further.



Communications Module Integration

The Communications Module or Network Interface Card (NIC), is available in a number of form factors. The DA NIC is based on the NIC511 Communications Module, which has a rectangular form factor and is shown below in Figure 2.

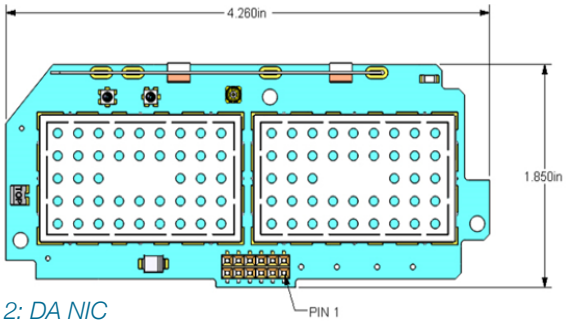


Figure 2: DA NIC

The DA NIC features a single TTL-level serial Universal Asynchronous Receiver/Transmitter (UART) for interfacing with the DA device (e.g. RTU). Please refer to the individual product specification documents for further details on the DA NIC.

Interfacing between the DA device and the NIC is via the serial UART. The NIC can be configured to operate in one of two modes – DNP3 or "raw". In DNP3 mode, the NIC performs conversion between serial and IP, resulting in the endpoint appearing as a DNP3/IP device from the SCADA Master's perspective. "raw" mode allows encapsulation of generic serial data in IP frames.

To illustrate how this works, a simplified network diagram is shown in Figure 3, The IP addresses of the key devices are shown in the diagram, including the DA NIC which is configured with address 10.110.249.1. The SCADA Master initiates a TCP/IPv4 connection to the NIC on port 20,000. With the connection established, the SCADA Master then sends through this connection to the DNP3 device with address 6517. The NIC receives the DNP3/TCP/IP message, strips off the TCP/IP header and forwards the DNP3 packet as a serial message to the DA device. The DNP device responds with a serial message, the NIC encapsulates the serial message in a TCP/IP frame and forwards back through the open TCP session to the SCADA Master.

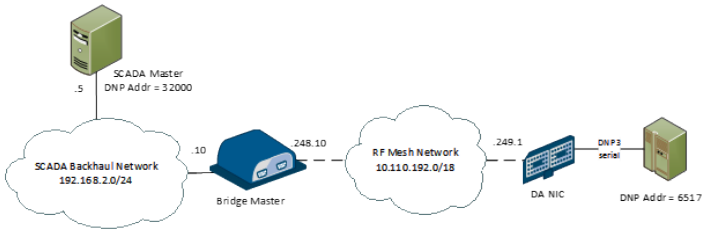


Figure 3: Simplified Network Diagram (DNP3)

The "raw" mode operates in much the same way, but uses TCP port 2001 on the NIC, and will encapsulate any generic serial data.

EQUIPMENT REQUIRED

As part of the DA Development Kit, the following equipment will be supplied: Field Service Unit (FSU) - This hardware device connects to a PC via USB and allows the software to communicate with Itron devices over the radio network. Figure 4 contains a photograph of the FSU.

Figure 4: FSU

Master Bridge – Itron hardware device that provides the gateway between the RF mesh network and the backhaul SCADA network.

Figure 5 contains a photograph of the Master Bridge.

Figure 5: Master Bridge

- 5 x DA NICs – Communications Modules or NICs that are embedded within the DA device.
- 1 x 12VDC Plug Pack Power Supply for the Master Bridge
- 5 x L-com HG903RD-SM 50Ω antennas, for use with the Master Bridge
- Communications Tester (CT) – Software used in conjunction with the FSU, which allows for configuration and diagnosis
- of Itron devices.
- Bridge Configurator (BC) – Software used in conjunction with the FSU, which allows for configuration, diagnosis and troubleshooting
- of DA networks.

Join us in creating a more **resourceful world**.

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