Solutions for SCADA Communications
and Protocol Translation
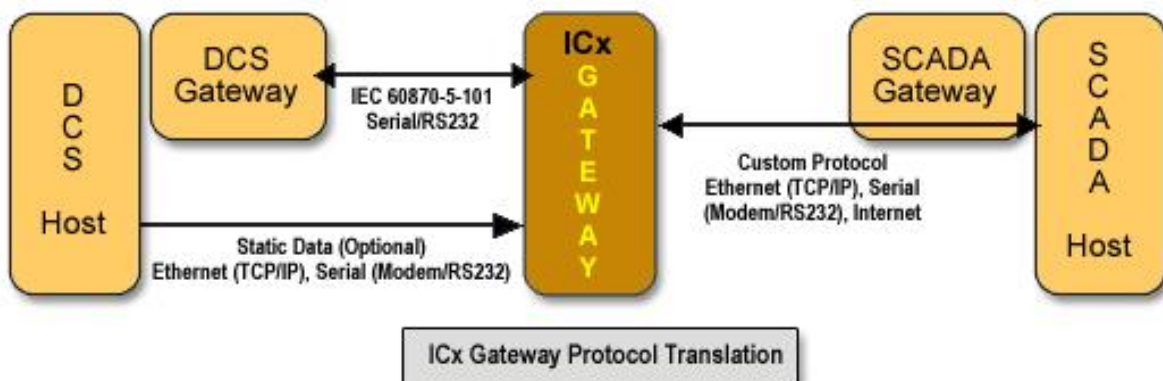
ICx Gateway

ICx Series Gateway is flexible and most advanced solution for information sharing among diverse control systems using different communication standards/protocols. ICx provides fast and economical solutions by utilising the existing infrastructure in the most efficient way. Gateway design helps eliminate the inconvenience typically encountered while bringing the diverse systems online and communicating among non-supporting systems.

ICx Gateway: Sample Implementation

.

ICx Gateway: Key Features

TIPL's ICx Series Gateway is a smart customer driven solution which combines flexibility and Technology. Features of ICx Gateway are:

Implementation:
⇒ Protocol Converter
⇒ Data Concentrator
⇒ Pass-through Configuration (Transparent Device)
⇒ Protocol Analyzer / Monitoring

Operating Mode:
⇒ Personal Computers (PC Mode): ICx Gateway can be implemented on any WINDOWS 2000/XP/WIN 7 based computers provided with required serial and Ethernet ports.
  o TIPL make TECH-4U series Xeon, Quad Core, Core 2 Duo and core i7/i5/i3 supported (Win XP/Win 7 32 bit or 64 bit)
⇒ Embedded Systems: ICx Gateway supports WINDOWS XPE/ CE/XP/WIN7/WES7/Ubuntu based devices. ICx gateway is successfully deployed over following devices:
  o ADVANTECH ADAM-5560CE PC Based Controller (Win CE Based).
  o ADVANTECH UNO-1140 Embedded Computer (Win CE based).
  o ADVANTECH ARK-1122C/3360F/5260 Embedded Computer (Win XPE/WES7/Ubuntu/Lubuntu Based).
  o ADVANTECH UNO-3074A Embedded Computer (Win XPE/Win XP/Win 7 32 bit or 64 bit).
  o ADVANTECH UNO-4683/4673A/4671A Fanless Computer (Win XP/Win 7 32 bit or 64 bit).

Redundancy:
⇒ Device Redundancy: ICx gateway devices can be configured for redundancy allowing seamless switchover from one device to another without effecting the communication.
⇒ Link Redundancy: Over a single ICx gateway, communication links (Serial / Ethernet) can be configured for redundancy, eliminating single point of failure.

Protocols
⇒ Full compatibility with Industrial standard Protocols.
⇒ Supported media types are:
  o Serial Interface (RS 232, RS 422, RS 485)
  o Ethernet/LAN (TCP/IP)

Database & Diagnosis
⇒ 128,000 I/O Tags
⇒ Integration with MS Excel for Protocol data points and parameters definitions.
⇒ Versioning (commented) of database allows full control.
⇒ Error reporting and protocol analysis enable easy maintenance of the system.

Sample Implementation

⇒ *Substation Gateway:* ICx can communicate with SCADA System / remote devices (RTU / PLC / Transformers / IEDs) and transfer the data to Remote Control Centres.

⇒ *Automatic / Remote Metering Device:* ICx can read data from meters and communicate this data to AMR Applications.

⇒ *IED Data Concentrator:* ICx can communicate with Multiple IEDs over RS 485 and extends the full control for the Master Station over single interface for all the IEDs.

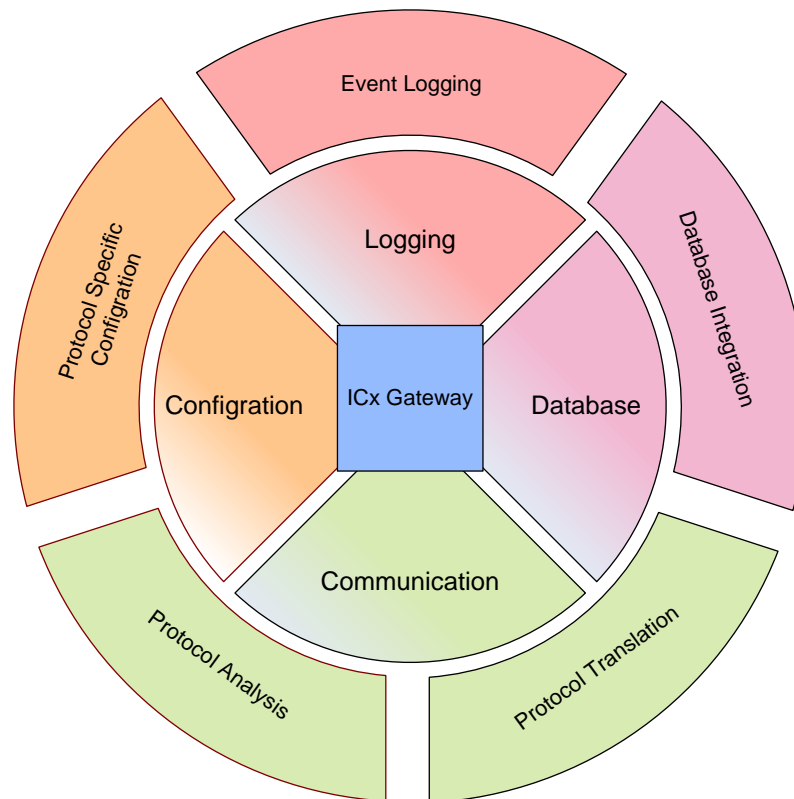# Requirement: Interfacing / Integration Device

Protocol Converter: ICx Gateway is an ideal solution for the any application where connectivity with different / unsupported protocols is required. The ICx gateway is a powerful protocol translation device designed with both Master and Slave components of various protocols, enabling easy communication to other devices. Example configurations are:

⇒ MODBUS Serial (ASCII / RTU) device interfacing with MODBUS TCP/IP Device though ICx Gateway

⇒ IEC 60870 – 5 – 101 Device interfacing with IEC 60870 – 5 – 104 device

⇒ MODBUS ↔ DNP3 ↔ IEC 870 Protocol Translation and Interfacing

⇒ MODBUS / IEC 103 ↔ IEC 61850 Protocol Translation and Interfacing

Data Concentrator: ICx Gateway provides a Single Interface (Slave) for the Master Device, and control / monitor data of the multiple Slave Devices including provision for Protocol Conversion and Data Concentration. Examples are:

⇒ MODBUS Serial (ASCII / RTU) device interfacing with Various MODBUS IEDs over RS 485 Link.

⇒ IEC 60870 – 5 – 103 Device interfacing with Various MODBUS IEDs over RS 485 Link.

⇒ IEC 61850 Device interfacing with Various MODBUS IEDs over RS 485 Link.

ICx Gateway: Modules

Protocol Support

The ICx Gateway supports the following Protocols:

⇒ IEC 60870-5-101 Master/Slave
⇒ IEC 60870-5-103 Master/Slave
⇒ IEC 60870-5-104 Client/Server
⇒ IEC 61850 Client/Server
⇒ ICCP
⇒ SINAUT
⇒ DNP3 Serial Master/Slave
⇒ DNP3 Network Master/Slave
⇒ MODBUS RTU Serial Master/Slave & TCP Master/Slave
⇒ Ethernet I/P
⇒ Profibus DP Master/Slave
⇒ HNZ Master / Slave
⇒ DLMS Master/Slave
⇒ OPC DA & AE Client / Server

Custom Protocol Support: All protocols supported are developed and maintained indigenously. TIPL has experienced team and expert domain knowledge to successfully develop and deploy any customer specific protocols.
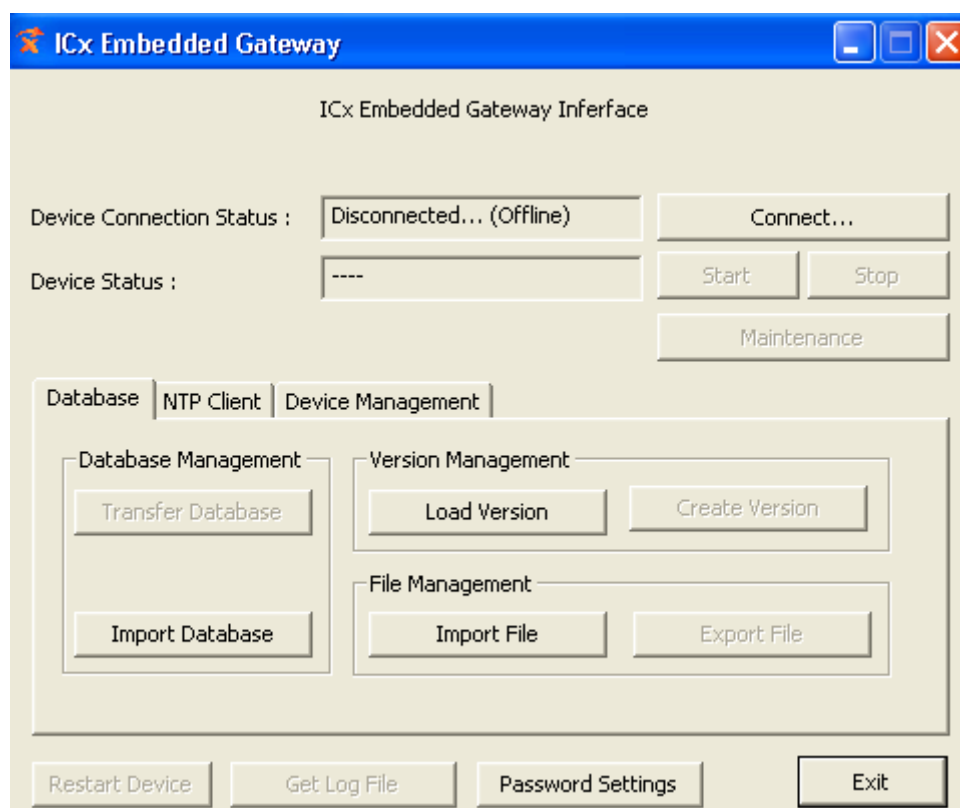
Configuration, Database & Maintenance

Configurator: ICx Gateways comes bundled with WINDOWS based Configuration Tool that allows easy data points (tags) configuration and mapping yet allowing full control over the application and protocol. ICx allows direct integration of MS Excel sheet, enabling faster and user friendly parameter configuration (basic as well as advanced). All protocol mappings and communication related parameters are comprehensively covered in Excel Sheets thus allowing complete and easy management of data points.

Database Management: When Excel Datasheets are imported into ICx Gateway, new Database is created. ICx allows versioning (with user comments) of the Database and user can switch to any version of the database as per requirements.

Maintenance: ICx Gateways has inbuilt Maintenance and Diagnosis Capabilities. It includes:
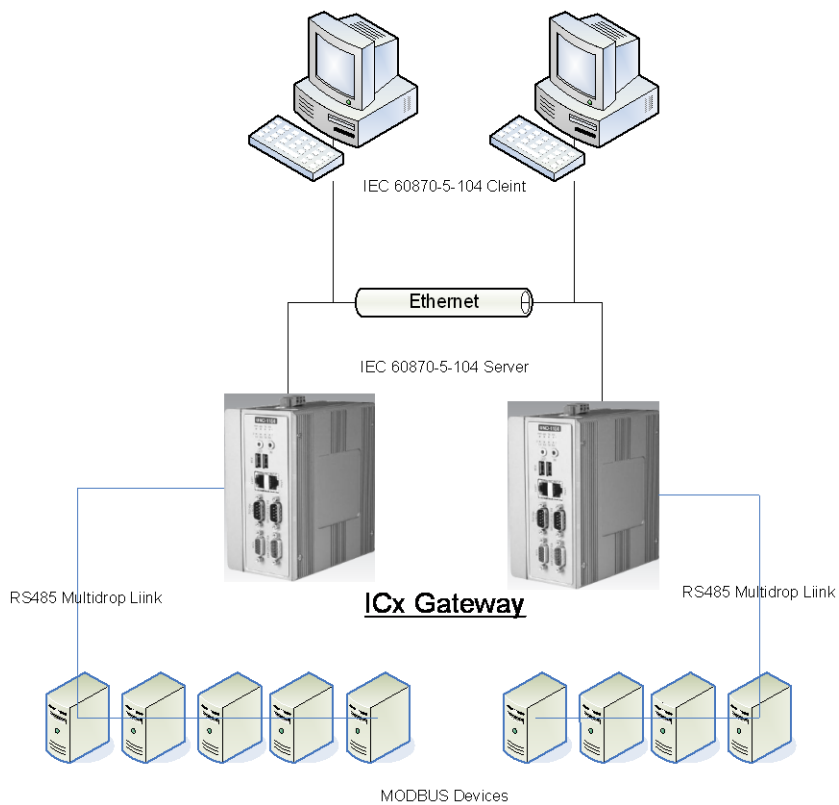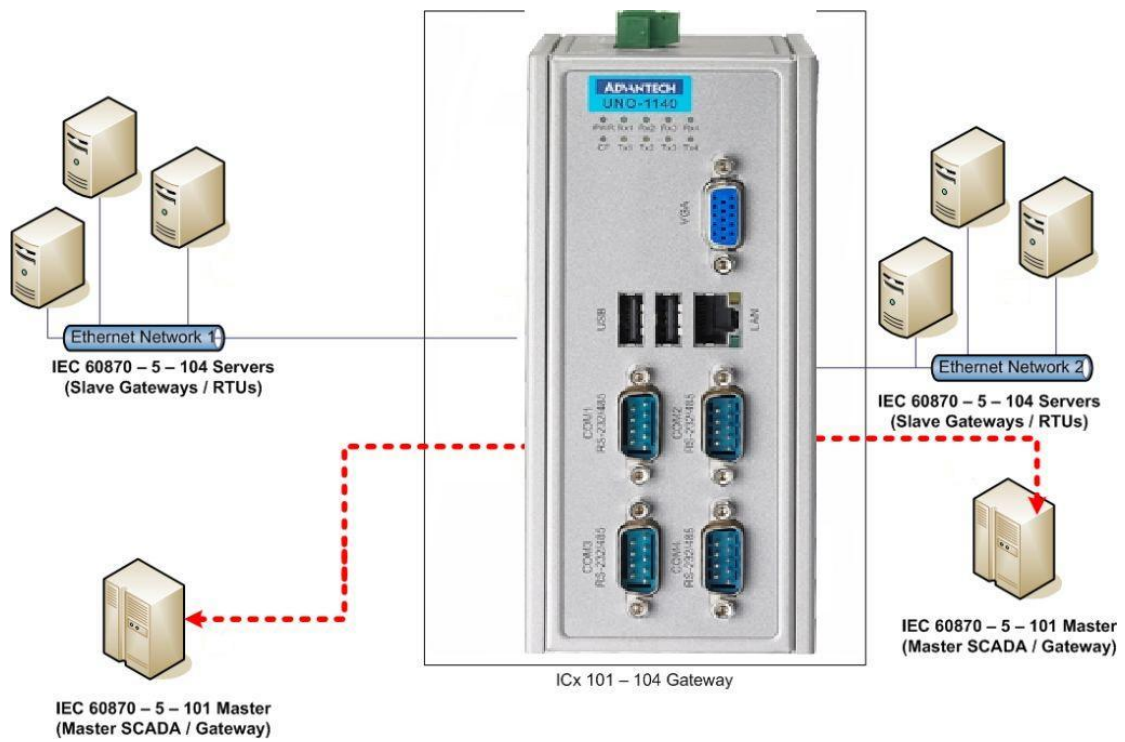- ⇒ Protocol Analyzer: Featuring protocol packet capturing & analysis, and Error Logging
- ⇒ Gateway Start / Stop
- ⇒ Database Management: Database Downloading and Switching

ICx Gateway: Partial Client List

Customer Name	End User Company Name
AREVA	LANCO/L&T
AREVA	TSEB / DEVELOPMENT CONSULTANTS
AREVA	IOCL
ALSTOM	PUNJ LLOYD / TCE
ALSTOM	GMR/TCE
ALSTOM	JIPTL / TCE
ALSTOM	BHEL
SCHNEIDER ELECTRIC	PGCIL
SCHNEIDER ELECTRIC	MRPL
ALSTOM	PGCIL
BS LTD.	PGCIL
ESHEEM	PGCIL
ALSTOM	RELIANCE INFRASTRUCTURE LIMITED
ABB	APTRANSCO
MOSERBAER	TATA POWER (NDPL)
ALSTOM	DELHI TRANSCO LIMITED
CONTROL & ELECTRIC	VIETNAM PROJECT
L & T	NUCLEAR POWER
SCHNEIDER ELECTRIC	G & SP
HONEYWELL AUTOMATION	MAHATRANSCO
PCI LTD.	HPPCL
PROTOCOL AUTOMATION	BHEL
ROCKWELL AUTOMATION	DUBAI METRO
SECURE METERS	APDRP PROJECT

Sample Gateway Applications

Ethernet Network 1

IEC 60870 – 5 – 104 Servers
(Slave Gateways / RTUs)

Ethernet Network 2

IEC 60870 – 5 – 104 Servers
(Slave Gateways / RTUs)

IEC 60870 – 5 – 101 Master
(Master SCADA / Gateway)

IEC 60870 – 5 – 101 Master
(Master SCADA / Gateway)

ICx 101 – 104 Gateway

IEC 60870-5-104 Cleint

Ethernet

IEC 60870-5-104 Server

RS485 Multidrop Liink

ICx Gateway

RS485 Multidrop Liink

MODBUS Devices

Sample Gateway: ICx3074A with 300 Devices