



Connecting to the IESO:

Setting Up Your Remote Terminal Unit (RTU) and Dispatch Workstation (DWS)

Marketplace Training

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Connecting to the IESO: Setting Up Your Remote Terminal Unit (RTU) and Dispatch Workstation

AN IESO MARKETPLACE TRAINING PUBLICATION

This guide has been prepared to assist in the IESO training of market participants and has been compiled from extracts from the market rules or documents posted on the web site of Ontario's Independent Electricity System Operator. Users of this guide are reminded that they remain responsible for complying with all of their obligations under the market rules and associated policies, standards and procedures relating to the subject matter of this guide, even if such obligations are not specifically referred to herein. While every effort has been made to ensure the provisions of this guide are accurate and up to date, users must be aware that the specific provisions of the market rules or particular document shall govern.

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1. Introduction

To participate in the IESO-administered markets, you will need to connect some of your equipment to the IESO, including your remote terminal unit (RTU) and your dispatch workstation (if you need one).

- You may need to install an IESO-certified RTU if we need to receive operational telemetry from your facility – we will let you know during the Market Entry process. For details, please see the *Participant Technical Reference Manual (PTRM)*, Section 4.1.2, *Qualified Devices*, available on our [Rules, Manuals and Forms](#) web page.
- If your facility is dispatchable, you need a dispatch workstation so that you can receive and respond to our dispatch instructions. Self-scheduling and intermittent generators, non-dispatchable loads, and transmission facilities do not need a dispatch workstation.

This guide explains what you need to do to install this equipment.

***Please read
this document
carefully***

You will need to read this document carefully to ensure the connection process is completed quickly and efficiently. If you are using a contractor for this work, please be sure to pass this document along to your contractor.

If you have questions about any of the steps, we are available to help you. Please contact us:

Market Entry:

Market.entry@ieso.ca

IT (for remote terminal units and dispatch workstation connections, and telemetry testing):

RTT@ieso.ca

Step 1: Send Us Your Information

**Start at least
6 months
before your
in-service
date**

Your first step is to send us information about your facility via the Facility Registration/Market Entry process.

We typically need your information at least six months before your first energization date:

- Installation of any IESO supplied communication equipment takes from six weeks to several months.
- We have to include your information in our network model before we can begin testing. Our operational testing takes just a few days, but we only perform network model builds once a month.
- If all goes well with testing, we use our next network build to bring your facility into production – but if there are any problems we will be delayed for at least a month.
- We may need to retest.

Single Line Diagram (SLD)

**Send us
your
information**

We need a single line diagram of your station. The SLD is a diagram of the electrical equipment at your station, and the connections to the IESO-controlled grid. The SLD should have operating nomenclature, not engineering nomenclature. If you have to change this nomenclature after it is set, please let us know as soon as possible. The SLD helps us:

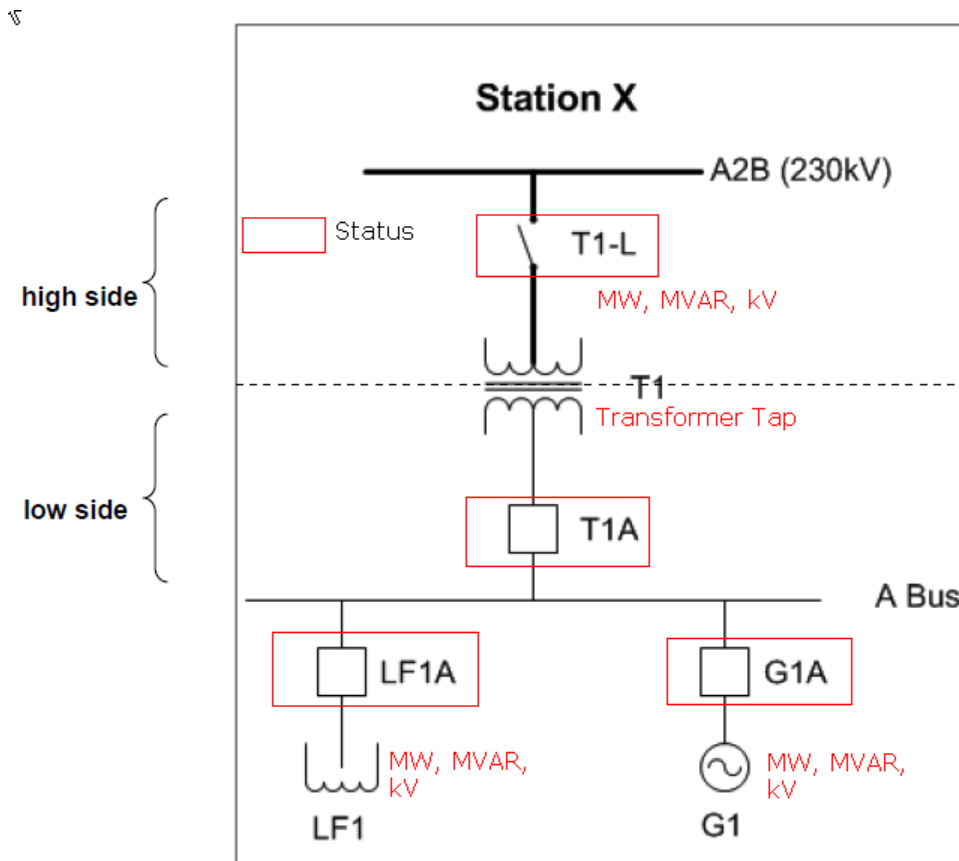
- Determine the telemetry points that we must receive from you
- Decide which names to use in our systems (See ‘Our Naming Conventions’)

Once you provide us with your SLD, we will produce an operational telemetering spreadsheet. This spreadsheet will have all of your requirements for your status points, i.e., breakers, all your analog points, i.e., MW, MVAR and kV, and if applicable, any Special Protection System points. This will be based on Appendix 4 of the Market Rules and your connection assessment.

Our systems model this information, and we include it in our database.

In this example of an SLD submitted by a market participant, the Market Entry project manager would request the following telemetering points:

**Simplified
SLD
example**



**What can
go wrong?**

The operational measurement of some of your equipment (such as a power transformer) can be measured from the high voltage side or the low voltage side. It is important that we know the exact location of where the measurement is being taken. If we model this information incorrectly in our systems, your first energization date will be delayed.

Before you receive your approval document to connect (New Facility Notification), you will be required to ensure that your telemetering has been tested and confirmed to be accurate.

Our Standard Sign Conventions for Analog Values
(subject to verification during point-to-point testing)

Generators

Generator output MW measured at the generator should be positive.

Loads

Load MW measured by the load should be positive.

Transformers connected to Generators

MW measured on the low tension side of a transformer should be positive.

MW measured on the high tension side of a transformer should be negative.

Transformers connected to Loads and Autotransformers

MW measured on the low tension side of a transformer should be negative.

MW measured on the high tension side of a transformer should be positive.

Our Standard Sign Conventions for Analog Values

(subject to verification during point-to-point testing)

1 = closed

0 = open

Our Naming Conventions

Our naming conventions give us information about the device. For example:

STATIONX-230.T1-L:ESTAT

- **STATIONX** is the name of the station
- **230** is the voltage level of where the status point is coming from
- **T1-L** is the name of the device
- **ESTAT** tells us that this is a status point, not an analog point
(A status point tells us the status of the device – usually, if it is open or closed; an analog point measures a quantity, e.g., **MW**, **MX**, **KV**. Note that **KV**, or voltage, is normally measured phase-to-phase.)

STATIONX-LT.T1A:ESTAT tells us that Point T1A is a point on the low side at Station X. (LT indicates a point on the low side.)

If you need help with this step, please contact us.

Once you have confirmed that the information we have is correct, you can begin preparing your site.

Operational metering gives us an instantaneous picture of what is happening at your facility. We use revenue metering for your market settlements.

**Operational
metering
vs revenue
metering**

Revenue metering and operational metering can sometimes reside in the same box – the revenue meter equipment may have built-in equipment that allows a remote terminal unit connection that you can use for operational metering.

Keep in mind that the timing for setting up revenue metering is different from the timing for setting up operational metering. Revenue metering can be in place and approved just before your first energization date – but this is too late to start testing your operational metering. (We have to test your operational metering before it can be introduced into our production system.)

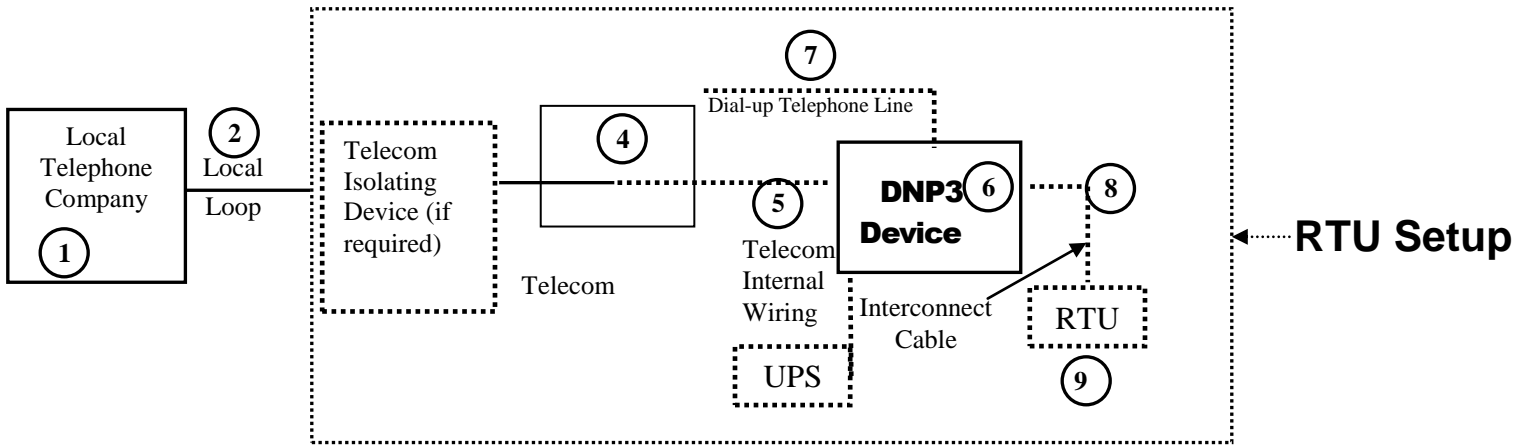
You may need at least six months to set up your operational metering. If you are using the revenue metering box to handle your operational metering connection, be sure you allow enough time to set up the operational metering so that you don't encounter delays.

Step 2: Installing Your Remote Terminal Unit (RTU) and Your Dispatch Workstation

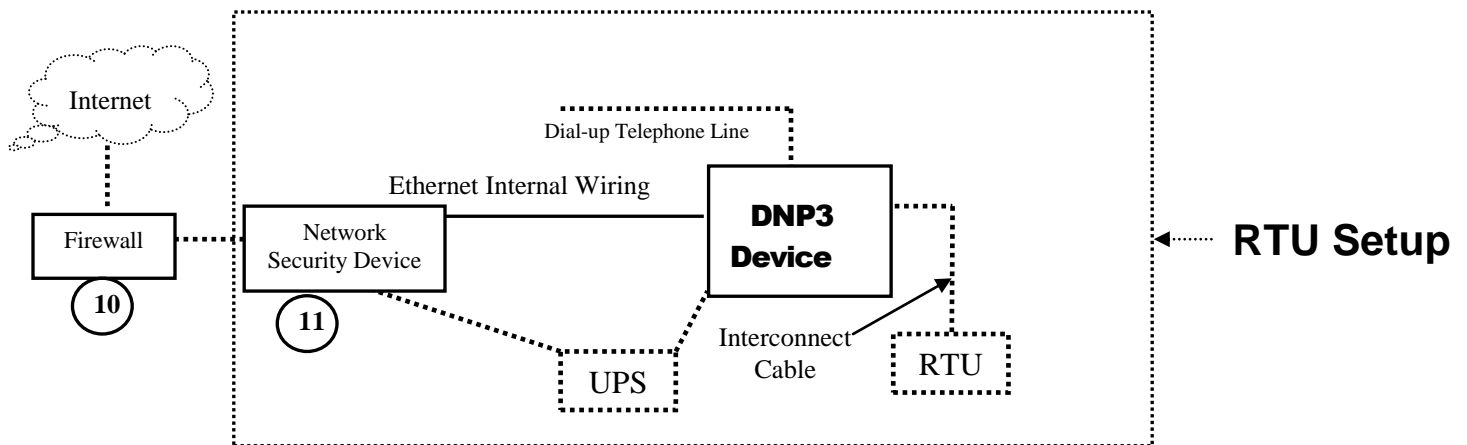
Below is a diagram of your connections.

Market Participant's Premises

RTU setup:



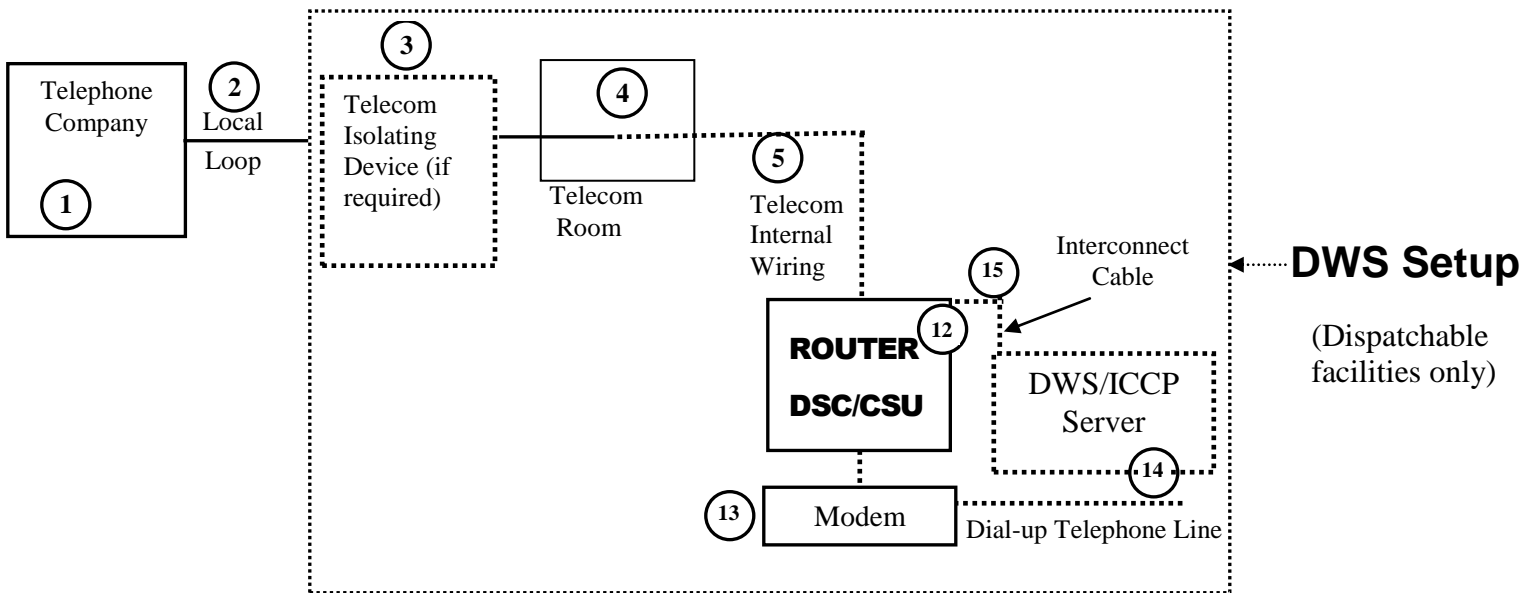
Site to Site VPN Connection:



Legend: — IESO responsibility to supply and install

..... Market Participant responsibility

DWS setup:



Legend: — IESO responsibility to supply and install

..... Market Participant responsibility

① This is your local telephone company.

Real-time network communication with the IESO Control Centre is via MPLS communication network using 16 bit DNP3 protocol.

We will provide and maintain the MPLS communication network, and we will coordinate installation with the communication carrier.

Once we receive your detailed address information, we will contact you to discuss the exact location of the installation. Installation will begin about four to six weeks later. We will need the name and phone number of your site contacts – we need a main and an alternate contact who are very familiar with your site requirements.

The communications carrier will confirm the appointment with your site contact a few days before the installation work begins. Please be sure that someone who is qualified to enter your site accompanies the representative from the communications carrier.

- 2 Installation of the local loop and other customer premises equipment**
The IESO will provide the DNP3 Device, MPLS router, and modems. You must provide access to the communications carrier for installing a local loop and other customer premises equipment.

Please be sure that someone qualified to enter your site accompanies the representative from the communications carrier.

This person should review this guide before the site visit.
- 3** The isolating device is a protective device used to safeguard telephone and control circuits from hazardous voltage surges. It is required in transformer station type environments.
- 4** The communication carrier will run the connection into your telecom room – then you provide:

 - **Space for the equipment**
You will need a suitable environment for your equipment (i.e., dry, clean, 0-40°C, free of electro-magnetic interference, etc.)
 - **Suitable power source**
This is typically a reliable source of 120V AC, 60 Hz – usually from an uninterruptible power supply (UPS) with a total load capacity of 200 watts – with at least 8 hours of survivability after the loss of power from the grid.
 - **Access for maintenance personnel**
- 5** Wiring from the telecom room to the DSU/CSU/ASE, DNP3/router connection point
This allows us to test the circuit thoroughly for equalization.
(We need FT6 Cross-Over cable with RJ-45 male connectors at both ends.)
- 6** DNP3 Device
We will provide the DNP3 Device. This is the telecommunications access device for the remote terminal unit (RTU) that will provide your real-time data acquisition of power system data that we need to operate the power system.
- 7** Dedicated telephone line
You will need to provide a dedicated dial-up telephone line so that we can connect to the DNP3 for remote maintenance. This line must be available 24/7.
- 8** You must provide the cable from the DNP3 to your remote terminal unit (RTU).
(Please see diagram on Page 9.)

- 9 This is your terminal unit (RTU), certified by the IESO following the requirements in the *PTRM, Section 4, Qualified Devices*. We will provide one connection to a master RTU that will provide all operational data required from your facility.

(Analog points are continuously varying measurements such as watts, volts and amps. Typically, the measurements are derived from a primary conversion device such as potential or current transformer and a transducer. Status points are typically discreet, binary values such as the open or closed status of a switch. The IESO standard for status points is 1=closed. This information is presented to the RTU by a contact whose state is representative of the state of the actual field device being monitored.)

- 10 It is recommended that the each Market Participant ensure that each participant workstation is protected by an appropriate firewall for the network and workstations being used. The choice of the technology to be employed is up to the Market

- 11 Where site-to-site VPN is the preferred method for a medium performance site, logical access via Internet Service Provider (ISP) to the public internet from the *IESO* network security device as well as physical access for *IESO* to install premises equipment such as a network security device and DNP3 communications device must be provided.

- 12 Participants who will be injecting energy into or withdrawing energy from the IESO-controlled grid and will receive dispatch instructions from us need a dispatch workstation. We will give you details about this during the market entry process.

The router for your dispatch workstation is a separate device from your DNP3.

- 13 We will provide a modem to allow dial-in access to the dispatch workstation router. You need to provide the DID (Direct Inward Dialing) phone number to our technical personnel before we can ship the modem to you.

- 14 You must provide a dedicated dial-up telephone line. We will use this line to connect through the modem to the router for remote maintenance. This line must be available 24/7.

- 15 The dispatch workstation connects to the IESO-supplied router over an ethernet connection. The wiring between the dispatch workstation and the router is your responsibility.

Testing of Telemetry Points

Once everything is installed, your IT contact will need to complete testing of telemetry points before any part of your facility is allowed to connect to the IESO-controlled grid. This ensures that we have proper visibility of your facility, thereby allowing us to maintain reliable operation of the IESO-controlled grid.

Testing of the Dispatch Workstation (Dispatchable Generators and Loads Only)

Once everything is installed, your Market Entry project manager will coordinate testing of the dispatch workstation. This will ensure that you receive any dispatch instruction that the IESO sends and that the communication path is correct.

Market participants have used this opportunity to also train their operators on receiving dispatch instructions.