

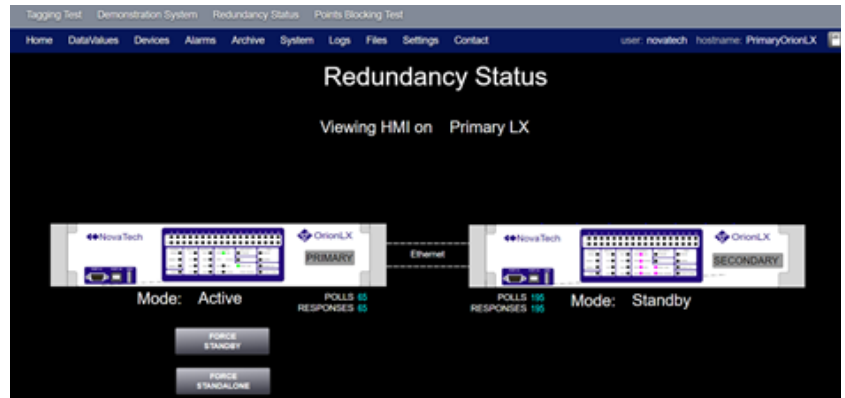
# Orion Hot Active—Standby Redundancy

## Product Description

A Hot Active—Standby Redundancy capability is now available for the OrionLX and the OrionLXm. This new design simplifies operation and diagnostics in the following redundant substation automation and SCADA applications:

- Orion as SCADA RTU
- Orion as Substation HMI
- Orion as Alarm Annunciator and SOE Recorder
- Orion as Substation Controller with low-speed to medium-speed logic
- Orion as SCADA Master

Real-time synchronization of operator HMI actions improves visibility and safety in larger substations



## Substation Automation Redundancy

Key features for Orion Redundancy in substation automation are described and illustrated in Figure 1 below.

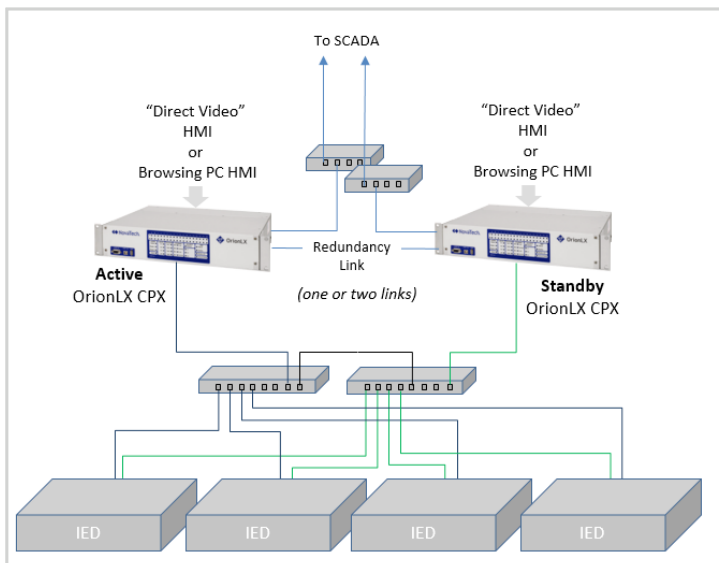


Figure 1 Redundant Active-Standby OrionLX System

- SCADA Event buffers are intelligently managed to avoid event floods.
- IP Addresses can flip-flop between Active and Standby Orion.
- Operator-initiated real-time actions are replicated bi-directionally (Active-to-Standby and Standby-to-Active):
  - ◆ Tags and Tag Log
  - ◆ Acknowledged Alarms
  - ◆ Blocked Points
- Operators can use either HMI for viewing status, placing tags, acknowledging alarms, blocking points or executing controls.
- Throwover to the Standby OrionLX can be accomplished manually or automatically.
- A “Standalone” mode is offered for testing configurations and for upgrading firmware.

## SCADA Redundancy

Key features for Orion in SCADA Redundancy are described and illustrated in Figure 2 below.

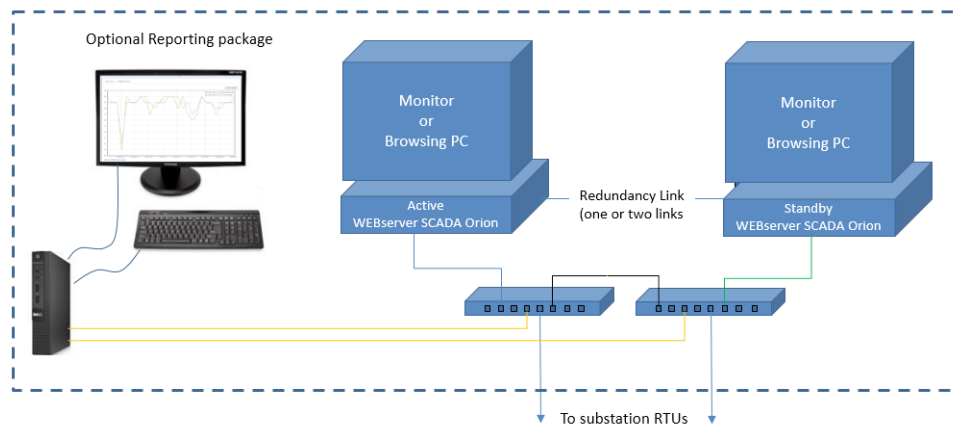


Figure 2: Redundant Orion WEBserver SCADA Master System

- Operator-initiated actions are replicated bi-directionally (Active-to-Standby and Standby-to-Active)
  - » Tags and Tag Log
  - » Acknowledged Alarms
  - » Blocked Points
- Operators can use *either* HMI for viewing status, placing tags, acknowledging alarms, blocking points or executing controls.
- The Standby Orion can be configured to poll or not poll substation RTUs. Polling confirms communication health.
- Configurations loaded to Active Orion will be automatically transferred to Standby Orion.
- Optional Reporting Package archives data from Active Orion.

## Orion Redundancy Link

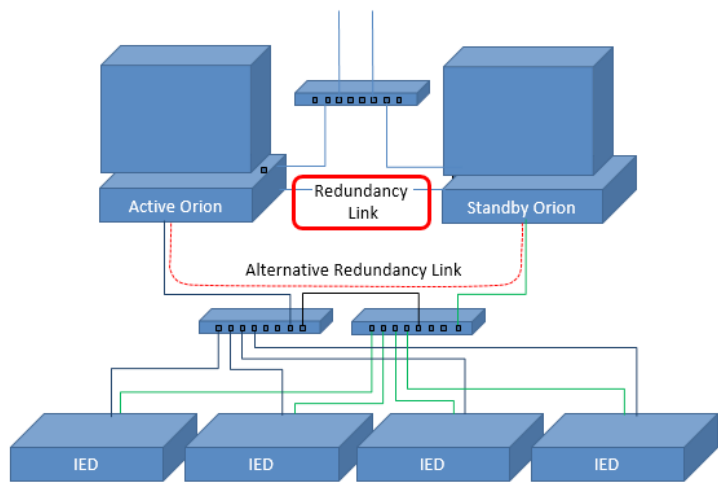


Figure 3: Redundant Link

See Figure 3 to the left. The Redundancy Link is used for:

- Keep Orion real-time databases synchronized
- Exchanging diagnostic and status data
- Moving any other real-time points from Standby Orion to Active Orion

The Redundancy Link between the Redundant Orions can be a single or dual Ethernet link. Any of the Orion Ethernet ports can be used, and the Link can be encrypted to increase security. The Link does not have to be dedicated to redundancy.

## IP Address Flip-Flop

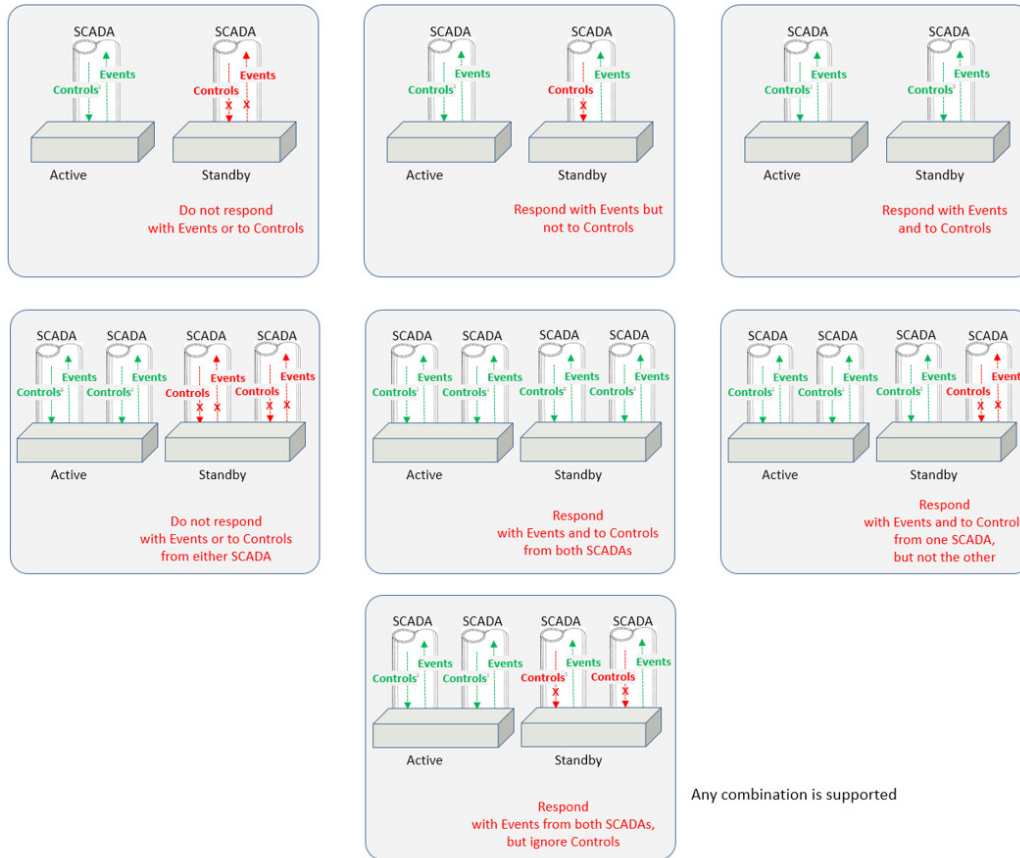
Both Primary and Secondary Orions have unique, assigned IP addresses. However, when Orion is "Active" it can be configured to assume a second, Alias IP address. This can be useful in accommodating broadband communication with legacy SCADA systems that must always poll to the same IP address.

## SCADA Port Management

The Standby Orion can be configured to respond, or not respond, to SCADA. Response choices below:

- Do Not Respond (DNP3 only)
- Respond with no Events and no Controls
- Respond with Events and no Controls
- Respond with Events and with Controls

Multiple SCADA connections on the Standby Orion can be managed individually. Configuration choices per SCADA Port on the Standby Orion are illustrated in Figure 4 below:



Figures 4: SCADA Port Management with Orion Redundancy

## Redundancy Status and Diagnostic Page

The pre-engineered webpage shown below in Figure 5 is provided with the Orion Redundancy option.

Normal Operation:  
Attached to Active Primary Orion

Tagging Test Demonstration System Redundancy Status Points Blocking Test

Home DataValues Devices Alarms Archive System Logs Files Settings Contact user: novatech hostname: PrimaryOrionLX

### Redundancy Status

Viewing HMI on **Primary** OrionLX

“Link” and “Activity” on all Ethernet ports

Redundancy Link Status

Indication of Role

Mode: **Active** (Primary OrionLX) | Mode: **Standby** (Secondary OrionLX)

On-screen controls: FORCE STANDBY, FORCE STANDALONE

Additional info: POLLs 65, RESPONSES 65 (Active); POLLs 195, RESPONSES 195 (Standby)

Figures 5: Pre-engineered Redundancy Status and Diagnostics Page

## New Redundancy Inputs and Outputs

The following new Master Input Points enable the status of Orion Redundancy to be monitored and diagnosed. New Master Output Points enable Orion to be forced into “Standalone” for testing or forced into “Standby” to force throwover.

<ul style="list-style-type: none"><li>• <b>Master Inputs</b><ul style="list-style-type: none"><li>– <b>Primary @Redun</b><ul style="list-style-type: none"><li>• 1 = This is the Primary Orion</li><li>• 0 = This is the Secondary Orion</li></ul></li><li>– <b>Active @Redun</b><ul style="list-style-type: none"><li>• 1 = This Orion is Active</li><li>• 0 = This Orion is Standby</li></ul></li><li>– <b>Standalone Forced @Redun</b><ul style="list-style-type: none"><li>• 0 = This Orion not currently forced to standalone</li><li>• 1 = This Orion currently forced to standalone</li></ul></li><li>– <b>Standby Forced on Primary @Redun</b><ul style="list-style-type: none"><li>• 0 = Primary Orion not currently forced to standby</li><li>• 1 = Primary Orion currently forced to standby</li></ul></li></ul></li></ul>	<ul style="list-style-type: none"><li>• <b>Master Output: Force Standalone @Redun</b><ul style="list-style-type: none"><li>1 = go to Standalone Mode from either Active Mode or from Standby Mode</li><li>0 = Revert back to previous mode</li></ul><p>Either the Secondary Orion or the Primary Orion can be forced into Standalone When an Orion is forced into Standalone, the points “Primary @Redun” and “Active @Redun go offline</p></li><li>• <b>Master Output: Force Standby @Redun</b><ul style="list-style-type: none"><li>1 = Force Active to Standby</li><li>0 = Return to unforced.</li></ul><p>Forces Active Primary to Standby</p></li></ul>	<p>Orion #1 (“Primary”)      Orion #2 (“Secondary”) Usually Active      Usually Standby Can be forced into Standby      Can become Active</p>
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## Redundancy Support Libraries

Three LUA libraries are provided:

- **“Master Poll Blocking”** forces the Standby Orion to not poll all attached IEDs or selected IEDs (or RTUs). This library will enable older IEDs that can only be polled by one Master at one time to be used in redundancy, and it is supported on DNP3 Serial Master, DNP3 TCP Client, Modbus Serial Master, Modbus TCP Client, SEL Serial Master and SEL over TCP Master. It also may be useful in redundant WEBserver SCADA applications where all RTUs are not accessible to both SCADA Masters at the same time. Note this library uses an existing LUA function that blocks polling.
- **“Slow SCADA Poll Monitoring”** turns a selected point ON if SCADA polling on one or more ports falls below selected rate(s). Slow poll may be a reason to force throwover. Note this library uses an existing LUA function that monitors SCADA polls.
- **“Auto-throwover Forcing”** enables throw-over to automatically occur if any number of failure or alarm conditions are present on the Active Orion, but not present on the Standby Orion.

## Features to Simplify Configuration Management

Both Active and Standby Orion run identical configurations (although IP addresses are different and independently set). Configuration files transferred to the Active Orion - .ncd configuration files, Math & Logic files (.bas, .lua, .ncz) and .svg webpages - are automatically transferred to the Standby Orion. This ensures that files are identical in the Active and the Standby Orion.

## Features to Simplify Testing and Commissioning

A special “Standalone” feature is provided to enable either Orion to be forced into a mode where it is removed from the Redundancy scheme, but still operates as a normal, non-redundant Orion. This enables safe testing of a new .ncd configuration file, a new Math and Logic scheme or new .svg webpage. After testing is complete and proper operation confirmed, the Orion can be forced back into Redundancy mode.

For more information, please visit our website at: <http://novatechweb.com>



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