Lutron LEAP Driver for Tridium Niagara

User Guide

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1 Introduction

Lutron Electronics[1] is a leading provider of lighting control systems and solutions for both residential and commercial customers. Founded in 1961 by the inventor of the original dimmer, the company has since expanded its offerings to include motorized shades, blinds, and temperature controls. With a strong commitment to innovation and quality, Lutron has become a trusted name in the industry, renowned for its advanced technologies and intuitive user interfaces.

The LEAP (Lutron Extensible Application Protocol) is Lutron's modern JSON-based protocol used by newer systems including Caseta, RA2 Select, RA3, and HomeWorks QSX. Unlike the older text-based Integration Protocol, LEAP uses TLS-encrypted connections with certificate-based authentication, providing enhanced security for smart home integration.

Lutron's diverse product lineup includes multiple systems using LEAP protocol:

System	Type	Communication	Size
Caseta	Residential	Wireless	Small, 75 devices
RA2 Select	Residential	Wireless	Small, 100 devices
RA3	Residential	Wireless	Medium, 250 devices
HomeWorks QSX	Residential	Hybrid	Large, 10,000 devices

Each Lutron installation includes one or more processors / smart bridges, keypads, and dimmers, as well as optional sensors, shades, thermostats, and other devices.

[1] All trademarks or registered trademarks are the property of their respective owners

2 Driver Concepts

The LEAP driver for Tridium Niagara communicates with Lutron systems via TLS-encrypted TCP/IP using the LEAP protocol on port 8081. It is an event-driven protocol: as soon as anything happens in the system (button press, light switching, shade opening, area occupation) it sends a notification message to Niagara.

The driver uses certificate-based authentication. Certificates are obtained through a pairing process where the user presses a button on the Lutron bridge while the driver initiates a connection. This one-time pairing generates unique certificates stored in the device configuration.

Niagara driver maps every Lutron resource to Niagara points:

- **Zones** (dimmers, switches, shades) map to **Numeric Writable** points for level control (0-100%)
- **Occupancy Groups** map to **Boolean Points** showing occupied/unoccupied status
- **Scenes (Virtual Buttons)** map to **Boolean Writable** points for scene activation
- **Button Groups** and **Areas** can be monitored for events

With Niagara points, one can:

- Activate lighting scenes based on schedules, the astronomical clock, and online weather service
- Start HVAC equipment when lights are on
- Connect multiple Lutron systems to build bigger systems more cost-effectively
- Control third-party lights and shades using Lutron keypads
- Integrate lights with security systems
- Enable many other complex control scenarios

3 Requirements

- Niagara-powered device with software v4.8 or later, such as JACE, Supervisor, or any OEM version
- LEAP driver module (leap-rt.jar) and license
- Lutron bridge/processor with LEAP support
- Network access to bridge on ports 8081 (LEAP) and 8083 (pairing)

Below is a list of supported Lutron systems and their LEAP-compatible devices:

Name	Bridge/Processor
Caseta	Smart Bridge Pro (L-BDGPRO2-WH)
RA2 Select	Main Repeater (RRK-SEL-REP2-BL)

Name	Bridge/Processor
RA3	Main Processor
HomeWorks QSX	Processor (HQP7)

Note: Standard Caseta Smart Bridge does not support third-party integration. Smart Bridge **Pro** is required.

4 Quick Start

1. Copy leap-rt.jar module to Niagara /modules folder and restart Workbench/Supervisor.
    a. If the driver will be hosted on PC: restart Supervisor station.
    b. If the driver will be hosted on JACE: import the module with all its dependencies into JACE and restart it.
2. Add **LeapNetwork** to the station Drivers folder.
3. Enter license code in **License** property under **LeapNetwork**.
4. Add **LeapDevice** under the network.
5. Set the **IP Address** of your Lutron bridge.
6. Run the **Pair** action and press the button on the bridge within 3 minutes.
7. Wait for **Pairing Status** to show “Pairing successful!”
8. Open device **Points** extension and discover/add points.

5 LEAP Network

LEAP Network is the container for LEAP devices. It provides standard Niagara network driver functionality.

Network properties:

- **License** – the code that allows the driver to run on your host.

In most cases only the **License** property needs to be configured at the network level.

Add the network by dragging **LeapNetwork** from the leap palette to the Drivers folder.

6 LEAP Device Folder

LEAP Device Folder is an optional container for organizing multiple LEAP devices. Use it when you have multiple Lutron bridges or want to group devices logically.

Add a device folder by dragging **LeapDeviceFolder** from the leap palette into the network or another device folder.

7 LEAP Device

LEAP Device represents a connection to a Lutron bridge or processor. Each device maintains a TLS connection to the bridge and handles all communication.

7.1 Device Properties

- **Pairing Status** – shows current pairing/connection status (transient, read-only).
- **Device Info** – shows bridge information after connection: device type, firmware, serial number, LEAP version.
- **IP Address** – IP address of the Lutron bridge.
- **Port** – LEAP communication port (default: 8081).
- **Pairing Port** – LEAP pairing port (default: 8083).
- **Client Cert** – client certificate obtained during pairing (auto-populated).
- **Client Key** – client private key obtained during pairing (auto-populated).
- **CA Cert** – CA certificate for bridge verification (auto-populated).
- **Points** – extension containing all points for this device.

7.2 Device Actions

- **Pair** – initiates pairing with the bridge. Press the button on the bridge within 3 minutes.
- **Send Command** – sends a raw LEAP JSON command to the bridge (for debugging/testing).

7.3 Pairing Process

The pairing process establishes trust between Niagara and the Lutron bridge:

1. Set the bridge **IP Address** in device properties
2. Right-click the device → Actions → **Pair**

3. **Pairing Status** will show “Press button on bridge…”
4. Press the physical button on the Lutron bridge within 3 minutes
5. The driver generates a certificate signing request and receives signed certificates
6. Certificates are automatically saved to device properties
7. **Pairing Status** shows “Pairing successful!” and connection is established

After successful pairing, the device will automatically connect on station restart using the stored certificates.

7.4 Fault Handling

When the device cannot connect, **Fault Cause** will show the specific reason:

- “IP address not configured” – set the IP Address property
- “Certificates not configured - run Pair action” – pairing has not been completed
- “Connection failed: [details]” – network or TLS error with specific message
- “Disconnected: [details]” – connection was lost, will auto-reconnect

The driver automatically attempts to reconnect every 5 seconds when connection is lost.

8 LEAP Points

Points represent Lutron resources such as zones (lights, shades), occupancy groups, scenes, and buttons.

8.1 Point Properties

Each point has an **Address** property with:

- **Resource Type** – type of Lutron resource:
  - **zone** – dimmers, switches, shades
  - **occupancyGroup** – occupancy sensors
  - **virtualButton** – scenes
  - **buttonGroup** – button groups (keypads)
  - **area** – areas
  - **device** – individual devices
  - **button** – individual buttons
- **Resource Id** – unique numeric identifier for the resource.

8.2 Point Types

Different resource types use different Niagara point types:

Resource Type	Niagara Point Type	Read/Write
zone	Numeric Writable	Read/Write
occupancyGroup	Boolean Point	Read-only
virtualButton	Boolean Writable	Write-only
buttonGroup	String Point	Read-only
area	Numeric Point	Read-only

8.3 Zone Points

Zone points control dimmers, switches, and shades. The value represents the level from 0-100%.

- **Reading**: Level is updated automatically when changed (subscription-based)
- **Writing**: Set the output value to change the zone level
- **Polling**: Zone status can be queried on demand

8.4 Occupancy Points

Occupancy group points show whether an area is occupied. The boolean value is:

- **true** – occupied.
- **false** – unoccupied.

Values are updated automatically via subscription.

8.5 Scene Points

Scene points (virtual buttons) activate predefined lighting scenes. Write **true** to activate the scene. The scene is triggered using a “PressAndRelease” command.

9 Point Discovery

The driver supports automatic discovery of all resources from the connected bridge.

9.1 Using Point Manager

1. Open the **Points** extension under the LEAP device
2. Open **Point Manager** view
3. Click **Discover** to query all resources from the bridge
4. The discovery pane will populate with:
    - Zones (with name, control type, device ID)
    - Occupancy Groups
    - Button Groups
    - Areas
    - Scenes (Virtual Buttons)
5. Select the resources you want to add as points
6. Choose the appropriate Niagara point type
7. Click **Add** to create the points

Discovery returns resource names as configured in the Lutron system, making it easy to identify devices.

9.2 Manual Point Creation

Points can also be created manually:

1. Open **Points** extension
2. Click **New** and select point type (Numeric Writable, Boolean Point, etc.)
3. Set the **Address** property:
    - Resource Type: select zone, occupancyGroup, virtualButton, etc.
    - Resource Id: enter the numeric resource ID
4. The resource ID can be found in Lutron software or by monitoring traffic

10 Zone Control Commands

The driver supports various zone control commands:

Command	Description	Parameters
GoToLevel	Set zone to specific level	0-100%

Command	Description	Parameters
Raise	Start raising (dimming up)	none
Lower	Start lowering (dimming down)	none
Stop	Stop raise/lower operation	none
GoToDimmedLevel	Set level with fade time	level, fade time
Tilt	Set shade tilt position	0-100%
GoToFanSpeed	Set fan speed	Off/Low/Medium/MediumHigh/Hig

Basic level control uses the point's output value. For advanced commands like Raise/Lower/Stop, use the **Send Command** action on the device with raw LEAP JSON.

11 Subscriptions

The driver automatically subscribes to status updates for:

- **/zone/status** – all zone level changes.
- **/occupancygroup/status** – all occupancy status changes.
- **/button/status/event** – all button press/release events.

This event-driven approach means points are updated immediately when changes occur, without polling.

12 FAQ

12.1 Pairing Issues

Q: Pairing times out with "Failed: no response"

- Ensure you press the button on the bridge within 3 minutes of starting the Pair action
- Check that port 8083 is accessible from Niagara host
- Verify the bridge is a "Pro" model (standard Caseta bridge does not support integration)

Q: Pairing fails with TLS/SSL error

- Ensure Java has up-to-date TLS support
- Check that no firewall is interfering with the TLS handshake

12.2 Connection Issues

Q: Device stays in fault after successful pairing

- Check **Fault Cause** for specific error message
- Verify the bridge is reachable on port 8081
- Ensure certificates were saved correctly (check clientCert, clientKey, caCert properties)

Q: Device shows "Connection lost" repeatedly

- Check network stability between Niagara host and bridge
- Ensure only one integration client is connected (some bridges limit connections)
- Check that bridge firmware is up to date

12.3 Point Issues

Q: Points do not update when lights are controlled from keypads

- Verify subscriptions are active (check for RX messages in trace log)
- Ensure the point's Resource ID matches the zone ID in Lutron system

Q: Scene activation does not work

- Scene points must be Boolean Writable type
- Write **true** to activate (false has no effect)
- Check the virtual button ID is correct

12.4 Troubleshooting

To enable detailed logging:

1. Right-click Station → Spy → logSetup
2. Set LeapNetwork logs to TRACE
3. Monitor Application Director for TX/RX messages

Log messages show: * TX: outgoing LEAP commands * RX: incoming LEAP responses and events