# Overview

This manual describes the installation, configuration, operation and troubleshooting of the Cisco GS7000 Super High Output Intelligent Node (iNode) software, as it relates to software, including the Local Control Software (LCS), software upgrade, and remote monitoring. The scope of this manual is for the iNode and the Local Control Software (LCS), and does not include details pertaining to the Intelligent Remote PHY Device (iRPD). For more information about the iRPD, see iRPD product page.

**Figure 1: High Level Architecture**
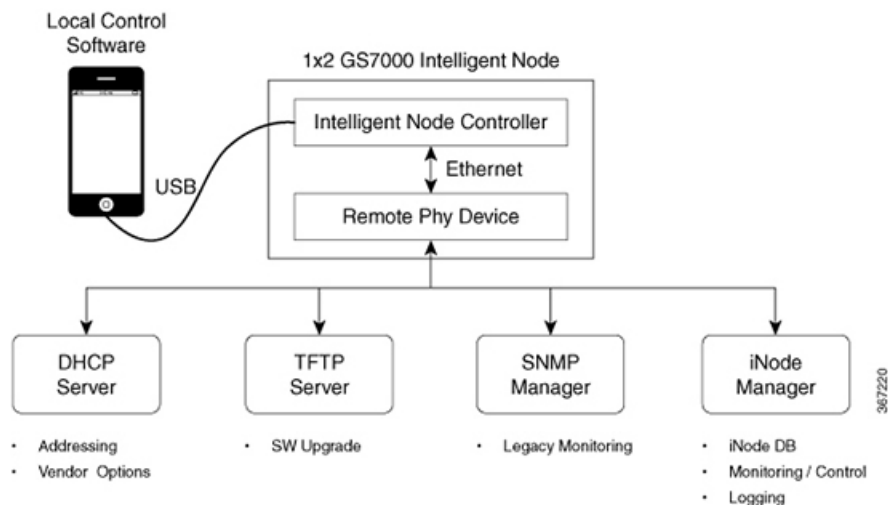


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## Background and Advantage

With the introduction of Remote PHY to cable access systems, the service group size for the typical Hybrid Fiber-Coax (HFC) node will reduce and the number of deployed HFC nodes will increase dramatically. The increase in the number of nodes deployed demands improved monitoring and control methods. Cisco's Intelligent Node brings greater stability, control, and visibility to cable operators. These advantages are realized through no-touch provisioning, elimination of RF accessories, remote control and monitoring, local control via a smart phone, and various features listed below. The remote access feature provides significant decrease in operating costs by reducing truck rolls to perform diagnostics.

# Features

## No Touch Provisioning

When the iNode boots up it has a default gain and tilt that can be overwritten locally or remotely. The node can obtain an IP address dynamically that can be used for software upgrades and monitoring.

## Eliminates RF Accessories

There is no need for external plug-ins. Attenuation and Equalization are digitally controlled via software. Target levels and tilt can be adjusted using the LCS application on a mobile device.

## Eliminates Specialized Test Equipment

Internal Spectrum analysis eliminates the need for external test equipment. LCS mobile application can be used to analyze spectrum capture results.

## Local Control and Monitoring via Mobile Device

The Local Control Software (LCS) is a mobile application for smart phone or tablet device that communicates directly to the iNode over a USB port.

The LCS provides the following:

- Node status summary
- Forward and reverse path settings
- Spectrum display
- Alarms

## Remote Control and Monitoring

Intelligent Node Manager (iNode Manager) allows the user to configure, organize, and monitor one or more iNodes remotely. Use iNode Manager with iNode software version 2.0 or later.

The iNode Manager provides capability similar to the LCS, including the following:

- Monitoring and Configuration
- Spectrum Capture
- Remote Reset
- Remote Log File Retrieval
- Auto-registration with iNode Manager

For more details, see the *Cisco Intelligent Node Manager 1.0.0 User Guide*.
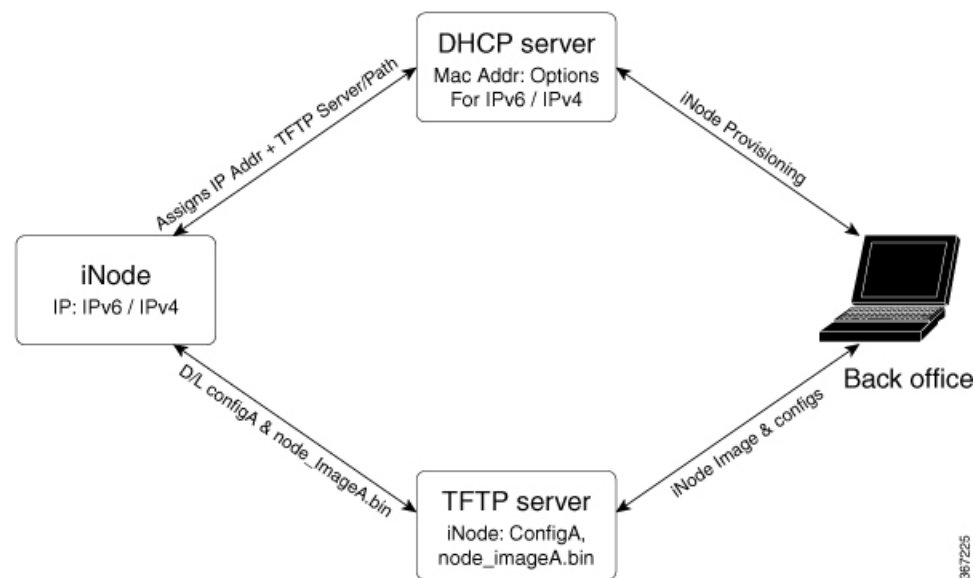
# Power Savings Mode

The iNode can be configured to automatically adjust the amplifier bias current based on the specific output power requirements. The bias current is automatically set based on plant configuration, such as maximum carrier frequency and modulation mode. It will adjust according to changes on the plant in order to maximize power savings without sacrificing performance.

# Remote Software Upgrade

The software can be remotely upgraded. At boot-up the iNode attempts to download a configuration file that indicates the latest version of software. Then, the iNode automatically updates to this version (see Software Upgrade). Software upgrade will not impact service.

# Remote Monitoring

External interfaces of the iNode include the USB port built into the iNode, and access to the HFC plant via the iRPD installed in the node housing. The cloud software component communicates downstream with the iNode via the customer's existing subscriber data network. Messages are transmitted through an Ethernet connection provided by the iRPD. However, the iNode has a MAC address and an IP address assigned via DHCP that are separate and distinct from the MAC address and IP address of the iRPD.



# Enable or Disable RF Ports

RF ports may be enabled or disabled individually via the LCS mobile application. This is helpful for power savings and in diagnosing issues. Also, forward or reverse can be disabled individually to assist in diagnosis.

# Spectrum Capture

The Spectrum analyzer capability supports:

- Bandwidth: 5 MHz to 1.25 GHz

- Amplitude resolution: 16 bits

- Averaging: 1 to 128 points (by powers of 2)

- Dynamic range for frequency step size

- Reverse path max hold

The spectrum capture accesses live data and can be performed on a per port basis.

# IPv4 and IPv6

The iNode works in either an IPv6 or IPv4, or dual stack environment. Dynamic addressing is supported via SLAAC or DHCP. A DHCP server is required to support the correct options for iNode remote operation (see Software Upgrade).