Media Gateway/Media Player 3.0.5

Provisioning and Installation Guide

Revision 1

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Overview

The ARRIS® Media Gateway / Media Player provides high-speed data, up to two lines of telephony service, and digital video service to subscribers over the HFC network. The optional ARRIS MS4000™ Media Steamer provides streaming of live or recorded TV programming, sporting events and premium content to SlingPlayer-enabled wireless mobile devices inside and outside the home.

The ARRIS Media Gateway / Media Player and MS4000 Media Streamer devices comply with the following standards where applicable:

- DOCSIS 3.0
- PacketCable 1.5
- Ethernet
- 802.11b/g/n WiFi
- MoCA 1.1

About This Manual

This manual describes functionality related to Media Gateway/Media Player firmware.

Some features described in this manual may not be fully tested and supported in your specific firmware release version. Where possible, features supported only by specific versions are indicated in this manual. See the *Release Notes/Letter of Operational Considerations* accompanying your firmware for further details.

Audience

This manual assumes that you have a basic understanding of DOCSIS and PacketCable standards, and a working knowledge of digital video, cable data, and telephony networks.

Supported Hardware

This section describes the ARRIS products supported by the firmware.

Media Players

The ARRIS Media Player provides video services via the Media Gateways. Video service is provided as IP encapsulated MPEG captured from the MoCA interface (or optionally over Ethernet) for MP2xxx Media Players and over MoCA, Ethernet, or WiFi for the IP815 Media

Player.Video is decoded for display via various high definition and standard definition multimedia interface outputs.

MP2000 Hardware Features

The following are standard hardware features for the MP2000:

- 115 VAC, 60 Hz
- NEMA 1-15 power port
- 1500 DMIPS Processor with 512M Memory for optimal performance
- Full HD 3D graphics
- HD/SD, MPEG4-10/H.264, MPEG-2
- Ethernet connector
- Two USB 2.0 Host ports
- F connector (MoCA 1.1)
- One HDMI 1.3b connector (supporting up to 1080p: 24/30/50/60 Hz)
- One set of component video outputs supporting up to 1080i
- One composite video output with stereo audio outputs for left and right channels
- One electrical S/PDIF digital audio output
- One optical S/PDIF digital audio output
- One IR RC-6 compatible remote control interface output
- RF remote support (dongle required)
- Reset switch
- Navigation buttons — arrows (left, right, up, down), OK, Menu
- Clock Display

MP2050 Hardware Features

The following are standard hardware features for the MP2050:

- 115 VAC, 60 Hz
- 2000 DMIPS Processor with 512M Memory for optimal performance
- Full HD 3D graphics
- HD/SD, MPEG4-10/H.264, MPEG-2
- Ethernet connector
- One USB 2.0 Host port
- F connector (MoCA 1.1)
- One HDMI 1.4 connector (supporting up to 1080p: 24/30/50/60 Hz)
- One IR RC-6 compatible remote control interface input
- RF remote support
- Reset switch

MP2150 NA/NR Hardware Features

The following are standard hardware features for the MP2150:

- Touch-sensitive interface on front panel
- 115 VAC, 60 Hz
- NEMA 1-15 power port
- 2000 DMIPS Processor with 512M Memory for optimal performance
- Full HD 3D graphics
- HD/SD, MPEG4-10/H.264, MPEG-2
- Ethernet connector
- One USB 2.0 Host port
- F connector (MoCA 1.1)
- One HDMI 1.4 connector (supporting up to 1080p: 24/30/50/60 Hz)
- One set of component video outputs supporting up to 1080i
- One composite video output with stereo audio outputs for left and right channels
- One electrical S/PDIF digital audio output
- One optical S/PDIF digital audio output
- One IR RC-6 compatible remote control interface input
- RF remote support (dongle required for MP2150 NA)
- Reset switch
- Navigation buttons — arrows (left, right, up, down), OK, Menu
- Clock Display

IP815 Hardware Features

The following are standard hardware features for the IP815:

- Standard and high-definition MPEG-2 and MPEG-4 formats, including full 1080p60 HDTV decode
- True 1080p high-definition playback
- Embedded IP networking over coaxial cable with integrated MoCA 2.0
- Two-way IP data communication
- Integrated 802.11ac Wi-Fi with internal 3x3 MIMO antenna array and 5GHz radio
- Default Wi-Fi security: WPA-PSK WEP-64/128, WPA, WPA2
- Powerful (MIPS) RISC processor
- Dolby® 5.1 (all Outputs) and Dolby Digital Plus 7.1 digital audio (HDMI only)
- IR and RF4CE remote control interfaces
- Power and Home LAN LEDs
- Rear panel USB 2.0 port
- Open GL ES 2.0—advanced 3D graphic acceleration
- HDMI and Composite Video (RCA) video outputs

- Optical S/PDIF and Analog L/R audio outputs
- Data support - USB 2.0, 10/100Base-T Ethernet, 802.11ac Wi-Fi (backwards compatible with 802.11b/g/n)

MS4000 Media Streamer

The MS4000 Media Streamer is a network-based video transcoder that can simultaneously decrypt, transcode and re-encrypt up to 4 streams of full 1080p HD video of live or recorded TV programming. The transcoded streams can then be served to wireless mobile clients inside or outside the customer's home.

MS4000 Media Streamer Hardware Features

The following are standard hardware features for the MS4000:

AUDIO & VIDEO Input over Ethernet

- Video: 4 x MPEG-2 or H.264 at up to 20Mbps
- Max resolution: 1080p30/1080i60/720p60
- Audio: MPEG-1 Audio Layer 1/2, Dolby Digital™
- Transport: MPEG TS

AUDIO & VIDEO Output over Ethernet

- Video: 4 x H.264 streams at up to 8Mbps
- Max resolution: 1080p30/1080i60/720p60
- Audio: AAC

ENCRYPTION

- Input: DTCP-IP protected stream
- Output: Studio approved security technology

SET-TOP BOX INTEGRATION

- Respond to DLNA discovery requests
- Request Live/Linear and DVR content using DLNA

ENCLOSURE

- Front Panel Indicators (Power, Network/STB Link, Streaming)
- Rear Panel 10/100/1000 Ethernet Interface
- Reset Pinhole Button
- Power Connector 12 Volt/1 Amp DC

Media Gateway

The ARRIS Media Gateway (MG5225) is a single CPE device enabling TV, DVR, telephony, and high speed data service in the home. These services are sent through local cable providers' HFC network using DOCSIS and MPEG RF interface standards.

The Media Gateway provides high speed data services in the form of a 4-port 10/100/1000Base-T router, MoCA 1.1 (except for HSD) or optionally via 802.11n Wi-Fi.

Note: The MG5225 does not allow wireless streaming of data services from the device to Media Players. Wireless is a function of the eRouter and any enabled Wireless IP in the home.

The Media Gateway is MoCA certified but support is limited to Media Players. The telephony services are provided as two independent lines of POTS (Plain Old Telephone Service) with optional battery backup to support lifeline telephony performance. The video services are provided as IP encapsulated MPEG distributed to thin-clients over either a MoCA home data network or Ethernet.

The Media Gateway provides a multi-room TV/DVR experience for 6 TVs (connected simultaneously) and 500 GB storage of recorded content on the hard disk drive, which can be expanded using external storage.

MG5225 Hardware Features and Support

The following are standard hardware features for the MG5225:

- North American DOCSIS 3.0 8 Downstream, 4 Upstream Cable Modem
- 115 VAC, 60 Hz
- NEMA 1-15 power cord 6ft/2 meters
- 4-Ports Gigabit Ethernet
- Two USB 2.0 Host ports
- MoCA 1.1 networking capability (for connecting Media Players)
- DVR functionality, including:
  - Six QAM tuners for video and conflict management
  - VOD/PPV support
- 500 GB Hard Disk Drive
- 802.11n Wi-Fi
- Two lines of Carrier Grade Voice — battery backed up to 8 hours of standby

This release provides the following hardware support.

- Supports ARRIS® Media Gateway/Media Player hardware.
- Supports an Ethernet interface to CPE.
- Supports a MoCA interface to CPE. (Multimedia over Coax Alliance)
- Supports an eSATA interface to external hard drives.

- Supports 8 DOCSIS 3.0 Downstreams and 4 DOCSIS 3.0 upstreams.
- Supports two lines of telephony.

DCX3635 Media Gateway

The ARRIS DCX3635 Media Gateway is a "headed gateway" that combines the video gateway and data gateway into one device (no telephony). It supports QAM/IP video services and high speed Internet access through an integrated modem and wireless router. The DCX3635 delivers video content to connected devices via MoCA 2.0, Ethernet, and Wi-Fi.

New and changed functionality

The DCX3635 offers features and functions that differ from the MG5225, including the following:

- Support for standalone installation/configuration (as a "headed" gateway, no media players are required in a single room/single TV environment)
- No embedded MTA for telephony .
- Support for MoCA 2.0 (MG5225 supports MoCA 1.1)
- Support for 802.11ac Wi-Fi
- Dual band concurrent radios that can be used at the same time vs switched radios on the MG5225 that can only be used one at a time.

DCX3635 Hardware Features and Support

The following are standard hardware features for the DCX3635

- DOCSIS Cable Modem
- Power, Home LAN, Record, Wi-Fi and High Speed Data LEDs
- RF4CE wireless interface
- IR remote control sensors
- F-connector for Cable input
- HDMI™ 1.4 output
- Baseband composite video output
- L/R audio output
- Optical S/PDIF digital audio output
- USB 2.0 Host Type A port
- MoCA 2.0 networking capability (for connecting Media Players)
- DVR functionality, including:
  - Six QAM tuners for video and conflict management
  - VOD/PPV support
- (2) 10/100/1000 Ethernet interface
- Mini-phone 3.5mm serial port and External IR input

- Cable Modem Reset and WPS Buttons
- RF Input Frequency: 54 MHz to 1002 MHz (audio/video)
- Tuning: 1GHz Full-Band Front End 16x 64-1024 QAM Demodulators DOCSIS 3.0 channel bonding
- Memory: 512MB Flash, 1.5GB DRAM
- Video: Video decode up to 1080p60 , MPEG-2, MPEG-4 AVC
- Composite Video Output Formats: NTSC, PAL-M, and PAL-Nc
- HDMI Video Output Formats: 480i/p, 576i/p, 720p, 1080i, and 1080p24/30/60
- Audio: Dolby Digital, Dolby Digital Plus
- Graphics: 1.2 Gp/s OpenGL 2.0, scalable video-in-graphics
- Wi-Fi 802.11n, 2.4GHz, 3x3 MIMO, 20/40 MHz channels 802.11ac, 5GHz, 3x3 MIMO, 20/40/80 MHz channels
- Hard Disk Drive: 500GB standard, 1 TB option
- Out-of-Band Modulation: Frequency agile receiver 70 MHz to 130 MHz
- Power Supply: 100 VAC to 240 VAC, 50/60 Hz input; 12 VDC output

This release provides the following hardware support:
- Supports ARRIS® Media Gateway/Media Player hardware.
- Supports an Ethernet interface to CPE.
- Supports a MoCA interface to CPE. (Multimedia over Coax Alliance)
- Supports WiFi to CPE.
- Supports an eSATA interface to external hard drives.
- Supports 8 DOCSIS 3.0 Downstreams and 8 DOCSIS 3.0 upstreams.

Core Functionality

The firmware provides the core functionality described in the following sections.

General Functionality

The firmware provides the following general functionality.
- Supports ARRIS® Media Gateways MG5125, MG5225, and DCX3635 and Media Players MP2000, MP2050, 2150 and IP815.
- Supports MS4000 Media Streamer.
- CPE Ethernet — 10/100/1000 BaseT / full-duplex / auto-negotiate functionality.
- Advanced web-based troubleshooting interface.
- Supports IPv4 addressing.

High-speed Data Functionality

The firmware provides the following functionality for high-speed data (DOCSIS).

- Compatibility with DOCSIS 3.0.
- Interoperability with ARRIS and other CMTS products.
- Automatic recovery following power failure conditions.
- Automatic recovery following restoration of RF cable cut conditions.
- Support of SNMP v1/v2c and v3 coexistence, with up to 16 permitted entries/rows.

Digital Video Functionality

This release provides the following digital video functionality.

- Interoperates with Cisco-based and Motorola-based headends.
- eSATA support for external hard drives.

Telephony Functionality

This release provides the following telephony functionality.

- Compatibility with PacketCable 1.5.
- Supports standard PacketCable provisioning methods.
- Supports Session Initiated Protocol (SIP) and Network-Based Call Signaling (NCS).
- Support for 20ms packetization rates.
- Supports optional battery backup for Media Gateway telephony.

The typical hold-up time for the MG5125 Media Gateway battery model BPB044S/H is:

Idle: 8 Hours

1 Line Off-Hook: 6 Hours

2 Lines Off-Hook: 5 Hours

Firmware Functionality

The firmware provides the following functionality:

Compliance and Interoperability

The firmware provides the following compliance and interoperability features:

- DOCSIS 3.0, including CableLabs CW53 ECNs
- PacketCable 1.5

Hardware Support

This release provides the following hardware support.

- Supports ARRIS® Media Gateway/Media Player hardware.
- Supports an Ethernet interface to CPE.
- Supports a MoCA interface to CPE. (Multimedia over Coax Alliance)
- Supports an eSATA interface to external hard drives.
- Supports 8 DOCSIS 3.0 Downstreams and 4 DOCSIS 3.0 upstreams.
- Supports two lines of telephony.

Telephony Functionality

The firmware provides the following telephony-related functionality and support:

- Supports access to 911 (emergency), 411 (directory), 311 (non-emergency), and 611 (repair) services.
- Dial pulse support for all eMTAs at 20pps ±2pps for networks using either GR-303 gateways (patent pending) or soft switches.
- Support for dialup fax and modem connections, disabling echo cancelation upon detecting fax or modem start tones.
- An adaptive jitter buffer minimizes voice delay based on network conditions.
- Supports KDC ticket caching for lower outage recovery times.
- Selectable sinusoidal or trapezoidal ringing wave forms to compensate for CPE incompatibility.
- SNMP3, IPsec, and encrypted voice traffic as required by PacketCable specifications
- Supports RFC 2833 (DTMF relay) functionality, a method for carrying DTMF and other telephony signals and events in RTP packets, instead of sending audio tones over the network.

  For NCS loads, the MTA signals RFC 2833 support by specifying "telephone-event" in the list of available CODECs during negotiation. For SIP loads, add "telephone-event" to the end of the **sipEndPntConfigCodecTable**.
- Fully NCS compliant.
- SIP signaling protocol support (available through a specific SIP firmware load).
- Supports PacketCable Multimedia QoS for interoperability testing and lab trials.
- End-to-end DQoS, providing an added layer of authentication, as well as DSx DQoS support.

Provisioning Functionality

The firmware provides a variety of provisioning options and functionality as follows:

- Full PacketCable provisioning with SNMP3 Network Management capabilities.

- ARRIS Enhanced Firmware Downloading feature (patent pending) that allows customers to match different firmware loads to multiple Media Gateway/Media Player hardware products in a single configuration file. Firmware downloads are not applied until all lines are on-hook. See Using Enhanced Firmware Loading.

- Secure firmware downloading, conforming to DOCSIS 1.1 and newer specifications.

- Ability to accept firmware download requests while a call is in progress, applying the downloaded firmware only after all lines have gone idle for 30 seconds.

- Supports DHCP option 122 or option 177 provisioning of MTA IP addresses.

- Support for the PacketCable Service Provider root certificate, the PacketCable Service Provider Test root certificate, and the ability to download other Service Provider root certificates.

- Configurable CallP feature to disable IPsec on CMS redirection.

- Retains the following settings (made using SNMP) over restarts: loop current, ringing waveform, phase reversed modem tone.

Management and Troubleshooting Functionality

The firmware provides the following management and troubleshooting functionality:

- PacketCable 1.5-compatible alarm and log interfaces.

- Web-based status monitoring and troubleshooting interface.

- Maintain loop idle voltage management output from the Telephony Modem when the telephony service connection is interrupted for short time durations (see Setting Loop Voltage Management).

- Supports Telnet and encrypted SSH access to a troubleshooting command line interface (CLI).

- Support for automatically timing out Telnet or SSH sessions after a certain amount of idle time.

- Automatic optional disabling of access to Telnet or SSH sessions after exiting the session.

- Optional persistent logging capability after exiting a Telnet or SSH session.

- PacketACE support for ARRIS Enhanced Firmware Downloading functionality TLVs. ARRIS PacketACE is a standalone software application to be used on a PC. The application is available through the ARRIS software download site.

- Simple DHCP server for improved debugging.

- Supports Voice Quality Metric reporting.

- Provides DHCP message trace logs.

- Support for loop diagnostics (see Running Loop Diagnostics).

- Support for periodic ToD resynchronization (see ToD Resynchronization).

Data Functionality

The firmware supports the following general data transport functionality:

- CM support for IGMPv1 and v2.

Subscriber Interfaces

The firmware supports the following subscriber interfaces:

- Support for LED status indicators
- PacketCable-compatible interfaces to data and telephony ports
- A web-based status monitoring interface
- (Media Gateway only) A web-based router configuration interface

Management Interfaces

The firmware supports the following management interfaces:

- A web-based advanced monitoring and troubleshooting interface
- A Command-Line Interface (CLI) accessible by Telnet or SSH
- SNMP (v1/v2c/v3) access for status monitoring, troubleshooting, and configuration

Standards Compliance

This chapter outlines DOCSIS and PacketCable compliance for this release, and describes ARRIS-proprietary extensions to the standards.

Whole Home Solution Telephony Modems running the firmware are designed to the following standards:

- DOCSIS 3.0
- PacketCable 1.5, including:
  - Provisioning methods — SECURE, BASIC.1, BASIC.2, HYBRID.1, HYBRID.2
  - Event reporting, including PacketCable 1.5 MIBs

DOCSIS Specifications

All DOCSIS specifications are available at the *DOCSIS web site* (*http://www.cablemodem.com/specifications/*).

- DOCSIS 3.0 Radio Frequency Interface Specification, SP-RFIv2.0-I11-060206
- DOCSIS 3.0 Operations Support System Interface Specification, CM-SP-OSSIv3.0-I08-090121
- DOCSIS 1.1 Baseline Privacy Plus Interface Specification, SP-BPI+-I12-050812
- DOCSIS 1.1 Cable Modem to Customer Premise Equipment Interface Specification, SP-CMCIv3-I01-080320
- eDOCSIS Specification, CM-SP-eDOCSIS-I13-070803

PacketCable Specifications

The firmware supports PacketCable 1.5 and Euro-PacketCable 1.5 specifications, and ECNs applicable to ECW39 certification. The following list shows PacketCable 1.5 specifications that apply to Media Gateway/Media Player firmware. All PacketCable specifications are available at the *PacketCable web site* (*http://www.packetcable.com/specifications/*).

- PacketCable Audio/Video Codecs Specification, PKT-SP-CODEC1.5-I02-070412
- PacketCable Dynamic Quality-of-Service Specification, PKT-SP-DQOS1.5-I03-070412
- PacketCable Network-Based Call Signaling Protocol Specification, PKT-SP-EC-MGCP-I11-050812
- PacketCable MIBs Framework Specification, PKT-SP-MIBS1.5-I02-070412
- PacketCable MTA MIB Specification, PKT-SP-MIB-MTA1.5-I01-050128
- PacketCable Signaling MIB Specification, PKT-SP-MIB-SIG1.5-I01-050128
- PacketCable MTA Device Provisioning Specification, PKT-SP-PROV1.5-I04-090624
- PacketCable Security Specification, PKT-SP-SEC1.5I02-070412

ARRIS® Media Gateway/Media Player Video Architecture and Data Flow

The ARRIS® Whole Home Solution includes the following ARRIS components:

- Media devices — Media Gateway MG5225 and DCX3635, Media Player MP2000/2050/2150 and IP815, and MS4000 Media Streamer
- ARRIS Headend Server (AHS)
- ARRIS Services Portal

The following diagram shows the general architecture.
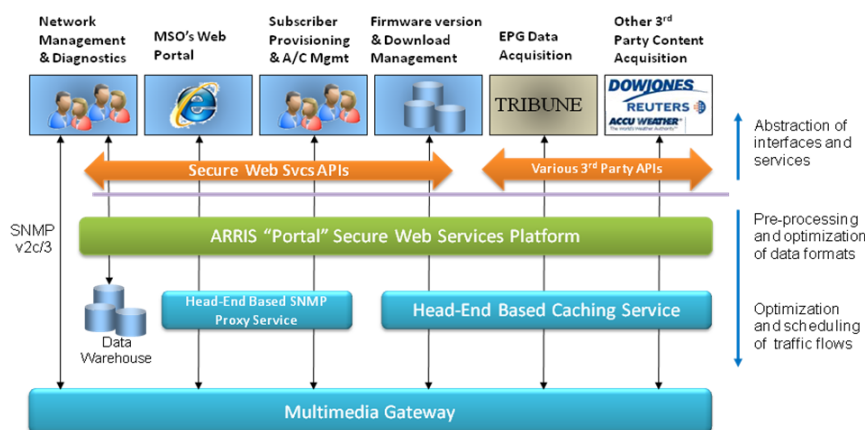
ARRIS Headend Server (AHS)

The ARRIS Headend Server is installed in the MSO headend. The AHS performs several functions:

- **AHS Data Caching and Proxy**: The AHS provides access to Media Gateway-specific data and software images, such as EPG, VOD metadata, VOD Billing, and software updates. The Media Gateway uses the AHS proxy for all HTTP traffic. HTTPS traffic can use either the AHS proxy, or be routed to the portal bypassing the proxy. The use of caching reduces the Internet bandwidth required to support the service.

- **Security**: The AHS Provides security through an integrated Linux firewall, which is automatically enabled and enforces security policies to restrict access to the server. The MSO may also place a firewall between the Internet and the AHS to add additional security.

- **Video On Demand (VOD) Services**: For headends with VOD, the AHS is also the VOD integration point. The AHS extracts metadata information from a variety of currently supported VOD systems. This metadata is parsed locally on the AHS and made available via HTTP so that it can be downloaded by the Media Gateway.

- **Pay-Per-View(PPV) Services**: For Cisco-based headends with ARRIS ConvergeMedia Manager, the AHS is the PPV integration point. The AHS houses a proxy service that communicates with the ConvergeMedia Manager to coordinate PPV purchases. Motorola-based headends do not use the AHS for PPV services.

ARRIS Services Portal

The ARRIS Services Portal has many functions that are integral to the ARRIS Media Gateway/Media Player. The most common functions of the portal are:

- Collecting and processing program guide data from national providers, and formatting it for the Media Gateway and Media Players.

- Providing subscriber-specific service entitlements to the Media Gateway and Media Players for download.

- Providing the Sling Finder ID to Mobile Apps, Stream Station settings, and entitlements and the transcoder firmware target for the MS4000 Media Streamer.

- Providing new software updates to the Media Gateway and Media Players.

- Collecting system health, diagnostic, and usage information from the Media Gateway and Media Players through a combination of SNMP and automatic log uploads by the Media Gateway.

- Storing data about each Media Gateway and Media Player in a central database, including device tracking, subscriber accounts, and service entitlements.

MS4000 Media Streamer Support

The ARRIS Services Portal provides the following:

- A "transcoders" Remote CC operation. This MG Remote CC request is to obtain the Sling Finder ID of the MS4000 connected to the MG.

- Stream Station Service. This allows MSO's to define station streamability.

Data Flow

The ARRIS Services Portal processes data originating from various feed partners and external data sources and the AHS caches it at the headend after the first Media Gateway requests the data. The AHS supplies the cached data to subsequent Media Gateways in that market.

The ARRIS Media Gateway/Media Player is designed to minimize network impact on headend resources. The Media Gateways should be provisioned with a minimum downstream DOCSIS speed of 384 Kbps, and upstream at 128Kbps. The majority of data transactions, such as EPG download, Context settings, Software Update, and Resource Download, occur between the hours of 1:00 a.m. and 6:00 a.m. (local time). The number of Media Gateways the AHS can support depends on the speed at which the AHS is connected to the MSO Network (1000/100Mbps).

System Management Tools

The ARRIS Services Portal hosts a variety of system tools for installation and remote management and diagnostics:

- MSO Administration Tool — creates users and roles for ARRIS tools
- CSR Tool — accesses event logs, account settings, and device system variables. See Troubleshooting with the CSR Tool for additional information on the CSR Tool.
- PPV Tool — sets PPV pricing and timing.
- Service Messages Tool — creates and schedules service messages.
- Stream Station Tool — identifies which guide data provider stations are streamable and where they can be streamed (in home, out of home, out of country).
- VOD Tool — manages VOD, including both assigning and publishing internal VOD genres to ARRIS mapped VOD genres.

The Installer Tool is a client-hosted tool that communicates with the ARRIS Services Portal to access device diagnostics and configure headend and channel map parameters.

ARRIS uses the Software Release Targets Tool to deploy software versions to a warehouse, market, or device.

Service Diagnostics

The ARRIS Services Portal maintains device usage and diagnostic data. Usage data are aggregated by market or headend, as the MSO chooses.

DAC/DNCS Control Messaging

ARRIS supports two modes of DAC/DNCS control messaging - out of band (OOB) for Motorola only and DOCSIS Set-top Gateway (DSG). The primary difference between these modes of communication is that DSG uses DOCSIS multicast with PIM enabled on the CMTS while the out of band (OOB) method uses the standard legacy method to reach the media gateway.

DAC/DNCS control messaging provides the Media Gateway with:

- Virtual channel table information (channel map)

- Conditional Access (CA)
- Video service entitlements
- Emergency alert system (EAS) alerts
- Pay-per-view poll requests
- Initializations
- Authentication
- Switched digital video (SDV) information

The Media Gateway uses the DOCSIS path to interact with the AHS and the ARRIS Portal to obtain:

- TV electronic program information (EPG)
- Software updates
- Account information updates
- VOD metadata
- Log file uploads
- SNMP device-level diagnostics

The Media Gateway sends HTTP requests directly to the AHS, where the AHS caches the requests. If the Media Gateway requests data not in the AHS pull-through cache, the AHS then forwards the request to the portal. Events are staggered and scheduled to occur daily in the early-morning hours when traditional cable modem traffic is at its lowest.

The Media Player portal interactions include a nightly check-in and log dump.

For IP address assignments, software loading, and other configuration data, the Media Gateway uses the standard DOCSIS communications channel.

ARRIS DSG

Upon bootup, the Media Gateway transactions differ depending on whether they are on a Motorola or Cisco headend.

Motorola Headends

A new Media Gateway finds an OOB frequency from a well-known scan list of OOB frequencies supported by the CableCARD. Upon receiving a hit from the DAC (ARRIS only), that configures the card as "MediaCipher CableCard MCard DOCSIS" and the Media Gateway may enter the DSG or IPDL mode. Once the mode is selected, the Media Gateway joins the appropriate DSG or IPDL MCAs and the appropriate controls are forwarded to the CableCARD.

Cisco Headends

Each time a Media Gateway boots, it finds the OOB signal using a brute force scan to determine the DCM (Downstream Channel Mode) setting. If the DCM is either Mixed DAVIC/DOCSIS or DOCSIS, the Media Gateway switches to DSG mode. The DOCSIS modem then finds an appropriate DOCSIS downstream that supports DSG and forwards headend control messages to the CableCARD.

Guide Data

ARRIS generates program guide databases which are downloaded from the ARRIS Services Portal to the Media Gateways. The guide data includes the following information for a list of stations:

- The description of a particular program
- The description of a station as well as information specific to the channel lineup
- Information about the scheduled broadcast of a program such as the database key, station, and start and end times
- Information about cast and production team members for a program
- Genre information for a program

Software Updates

DOCSIS software download is supported through the standard DOCSIS load servers for the Media Gateway ECM/EMTA. The eSTB software for the Media Gateway and the Media Player are loaded from the Portal through the AHS.

New versions of software are stored at the ARRIS Services Portal and once reviewed, tested, and accepted by the customer, can be distributed to the Media Gateways and Media Players using the Software Targeting Tool at the ARRIS Services Portal. ARRIS Services Portal Software Release targeting options are:

- Target an individual or group of Media Gateways and Media Players
- Target an entire market of Media Gateways and Media Players
- Target a warehouse AHS where Media Gateways and Media Players are staged

Account Settings

The following account information is downloaded from the ARRIS Services Portal to the Media Gateway and the Media Players:

- Account status
- Provisioned device ID
- Rate codes
- Headend and channel map
- Privacy settings

VOD

The AHS extracts guide information from the VOD system and converts it to a generic VOD database.

Once the data is ready for download, the Media Gateway requests the data from the AHS where it is cached for use by the Media Gateway.

Log Files

Each Media Gateway keeps a copy of the daily logs on its hard drive. Each night during the scheduled check, the current log set is uploaded and sent to the portal using an HTTPS POST operation, where they are stored in the database. All log data is usually smaller than 100K bytes. Use the CSR tool to access the logs or request logs from the ARRIS NOC.

PPV

For headends with the ARRIS ConvergeMedia Manager and a DNCS, the AHS proxies requests from the Media Gateways to the CMM for PPV events.

When a subscriber is considering a Pay-Per-View show, the Electronic Program Guide displays a menu of options for each show that includes whether or not the show can be recorded.

Digital Music Functionality

The firmware supports the following local and premium digital music channels:

- Local Music Channels

  Local music channels refer to music channels that are often included in an MSO broadcast offering. These may be rebroadcast local radio stations or genre-based stations such as "Hits of the 60's and 70's".

- Premium Music Services

  The Premium music channels are DMX, Music Choice, and Galaxie Music. The content has a proprietary format.

Video Pre-Provisioning (Warehousing)

Note: Local practices may override these general pre-provisioning procedures.

This chapter describes the network architecture and process flows necessary to pre-provision the Media Gateway and Media Player for future deployment. This process is also known as *warehousing*.

Pre-provisioning may be used to:

- Clear the hard drive and flash memory of returned devices to ensure that recorded content and customer-specific settings have been deleted.
- Fully test the hardware of new returned units (video, audio, tuning encrypted and non-encrypted channels, etc.).
- Load the most recent version of firmware.

Pre-provisioning helps to avoid potential hardware or firmware issues that could lengthen installation time or require a second truck roll to correct problems.

General Configuration

The network configuration necessary to support the warehousing processes for both Media Gateways and Media Players is shown in the following diagram.
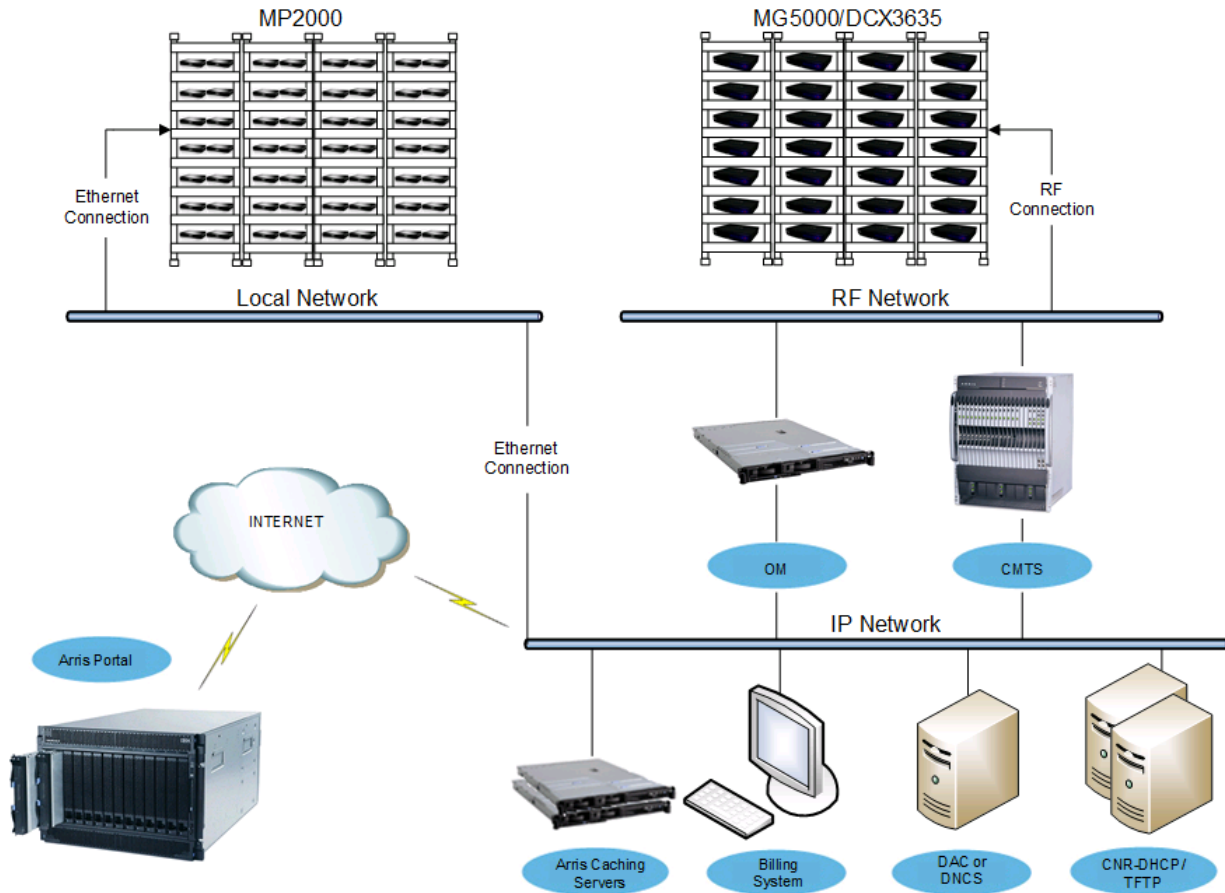
The major components of MSO infrastructure include:

- The billing system
- Headend control (Cisco DAC or Motorola DNCS)
- CMTS
- CNR or BACC infrastructure

Access to the ARRIS Services Portal and headend caching server are required if the Portal is used for firmware download.

Firmware Update Method

The warehousing process supports the Portal method for updating firmware onARRIS® Media Gateway/Media Player devices: For Portal-based updates, the devices need Internet access to the Portal.

Media Gateway Warehousing Process

Media Gateway warehousing takes place in two stages, Cable Modem and Video warehousing.

Warehousing Process Overview

The warehousing process covers devices received in any of the following ways:

- A newly manufactured device received at the MSO warehouse direct from the manufacturer or RMA center.
- A device removed from a subscriber's home and delivered to the MSO warehouse by a technician.
- A subscriber returned the device to an MSO contact center, which was then delivered to the MSO warehouse.

Regardless of the origin of the device, the warehousing process has two phases with a reboot in between. The phases are:

Phase 1

Verify the devices' installed firmware version in both the primary and secondary partitions against the targeted firmware, and perform a firmware upgrade if necessary.

Phase 1 ends with a required reboot.

Phase 2

After the reboot, Phase 2 begins with erasure of all previous customer settings and recordings. If a firmware update is necessary, the firmware upgrade is performed on the primary partition.

The pre-provisioning process is designed for multiple devices; a typical configuration is 5 racks with up to 20 devices each. Not including connecting and disconnecting, the entire process takes less than an hour.

Preparing a New Media Gateway Device

Follow these steps to prepare a new or repaired Media Gateway device for pre-provisioning.

1. Unpack and inspect received Media Gateways according to local practices. Contact the shipper if a received device appears to be damaged.
2. Scan or upload device information into the billing system, and DAC or DNCS, and assign warehouse status to the device.
3. Proceed to the Media Gateway pre-provisioning procedure.

Preparing a Technician-returned Media Gateway Device

Follow these steps to prepare a Media Gateway returned to the warehouse by a technician:

1. The technician should perform the following steps:
   a. Remove the device from the previous subscriber's account.

b. Associate the device with the TECH buffer.

c. Return the device to the warehouse.

The following steps are performed at the warehouse:

1. Scan the bar code on the device and assign warehouse status to the device.
2. Connect the device to the HFC network and poll for any unbilled PPV events.
3. Disconnect the device and proceed to the Media Gateway pre-provisioning procedure.

Preparing a Subscriber-returned Media Gateway Device

Follow these steps to prepare a Media Gateway returned to a retail site by a subscriber.

1. The retail site should perform the following steps:
   a. Remove the device from the previous subscriber's account.
   b. Assign front counter status to the device.
   c. Return the device to the warehouse.

   The following preparation is performed at the warehouse.

2. Scan the bar code on the device and assign warehouse status to the device.
3. Connect the device to the HFC network and poll for any unbilled PPV events.
4. Disconnect the device and proceed to the Media Gateway pre-provisioning procedure.

Media Gateway Warehousing Requirements

- ARRIS AHS (ARRIS Headend Server)
- ARRIS Portal warehouse configuration and software targets defined
- USB drives
- CableCARDS.
  - Cisco DNCS plant: CableCARDs will need to be installed within this process
  - ARRIS DAC plant: CableCARDs will already be installed
- Billing System access
- Cable Modem Provisioning System (CableModem requires at least a 10mb connection speed)

Media Gateway Cable Modem Warehousing

Cable Modem Warehousing is the first stage of the Warehousing process. Perform the following steps to complete Cable Modem Warehousing for Media Gateways:

1. Enter or scan the Gateway, CableCARD and Cable Modem into billing system and cable modem provisioning system.

   Depending upon the MSO's billing system, the Gateway, CableCARD, and Cable Modem can be entered as individual or single inventory records. MSOs should contact their billing vendor for specifics about creating an inventory record for a two-way advance DSG CableCARD device with an internal Cable Modem.

2. Stage Cisco DNCS CableCARDs (only Cisco CableCARDs need to be staged at this point)

   a. From the billing system, send the pair command to the DNCS.

   b. If pairing is not supported from the billing system enter Gateway Host ID and CableCARD Mac Address into the DNCS.

3. Insert the paired CableCARD into the Gateway.

4. Set up a USB flash drive for Warehousing.

   a. Add a file called "trigger_warehouse" with no extension to the root directory of the drive. The file needs to contain two lines as follows:

   CONFIG_CONTEXT=*context string* *

   CONFIG_WAIT_FOR_CM_UPDATE=1

   *Replace *context string* with the context string value defined within the ARRIS portal MSO Infrastructure tool for the warehouse defined. Contact your ARRIS Deployment Engineer for the correct context string.

5. Upgrade the Cable Modem.

   a. Verify the CM config. file has been updated to include all necessary settings for proper functionality.

   Refer to the ARRIS Whole Home Solution Firmware release notes for specific cable modem upgrade considerations.

   Warehousing the Gateway requires provisioning of bcm0 (public interface) and a minimum download speed of 10Mbps.

   b. Scan the Gateway cable modem into the billing system or cable modem provisioning system.

   c. After the cable modem provisioning has been verified, plug in the USB drive, connect coaxial cable, and then connect power to the Gateway.

MG5225

RF   USB   Power

Figure 1:

DCX3635

During the boot process, the Gateway's cable modem first locks onto the downstream and then the upstream, registers with the CMTS, downloads the CM configuration file, and starts the cable modem firmware upgrade.

All of the MG5225 cable modem LEDs light up and become solid (not blinking) when the cable modem becomes online. The red Record light then begins to flash, indicating that the warehousing process has started.

MG5225
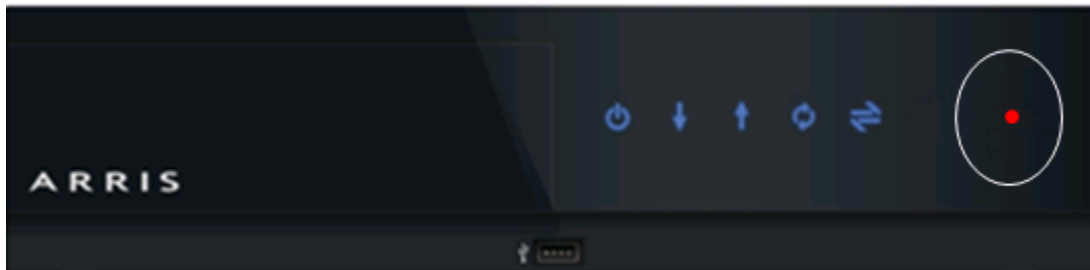
The DCX3635 does not have cable modem LEDs but the yellow High Speed Data light becoming solid indicates that the cable modem is online. The red Record light then begins to flash, indicating that the warehousing process has started.

DCX3635

During the cable modem firmware upgrade on the MG5225, both the downstream and upstream LEDs begin to slowly flash on and off in unison.

MG5225

The DCX3635 does not have any cable modem LEDs so no LED pattern showing cable modem firmware download status displays.

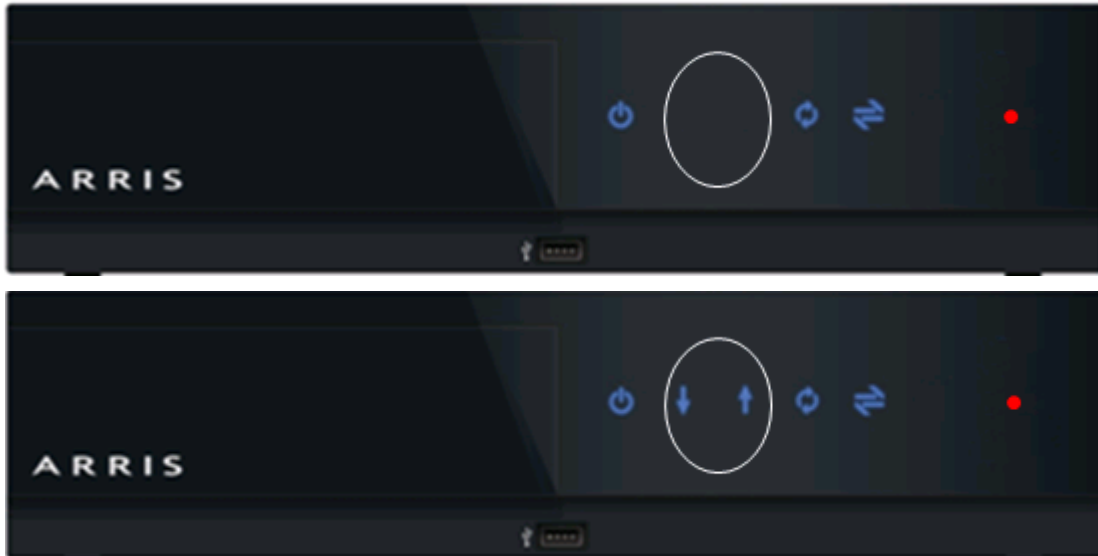When the cable modem download is complete, the Gateway reboots and then applies and starts the video side of the warehousing process automatically.

Media Gateway Video Warehousing

When the Cable Modem firmware upgrade completes, the video side of the Media Gateway starts automatically. This section describes the video warehousing process.
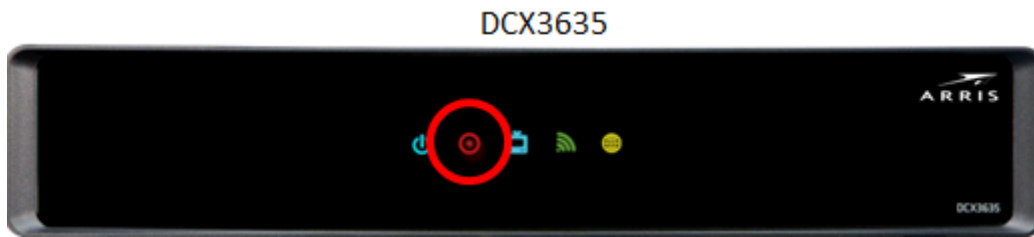
After the Cable Modem Firmware upgrade is complete, the red Record light continues to illuminate showing the Gateway is performing the warehousing process.

 The lack of any blink pattern should also be treated and a (Error Condition)

MG5225
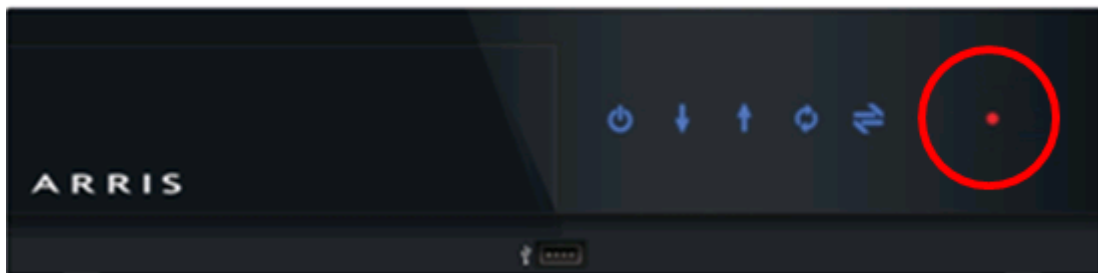
DCX3635

The following is an illustration of the LED patterns and their meanings.

Phase	LED sequence				
Process not started	—	—	—	—	—
Startup and normal processing	•	—	•	—	•
Error condition	•	•	—	•	•
Process complete	•	•	•	•	•

  In the case of an error condition, the Media Gateway retries until the error condition is corrected or the device is re-booted.

The Gateway contacts the ARRIS Portal, downloads warehouse context settings that will redirect the Gateway to the AHS (ARRIS Headend Server), and then downloads the warehouse target software version. When this process completes, all previous customer settings and DVR recordings are deleted, the Gateway reboots and downloads a second copy of the warehouse software targeted version.

When the RED record light changes to the fast blink pattern, the upgrade is complete.

If you are using a Cisco CableCARD, Media Gateway Warehousing is complete. If you are using an ARRIS DAC Cable CARD, perform the following steps to stage the CableCARD.

1. Scan or enter the CableCARD serial number into the billing system emulator or DAC and send an `onplant Init`. The CableCARD takes the `init` and begins to download firmware. The download typically takes 10 minutes to complete, depending on network bandwidth.

2. Send the CableCARD a `Refresh` then a `validate` from the DAC.

    This step switches the CableCARD from out of band mode to Advanced DSG mode.

Media Player Warehousing Process

Use this procedure to pre-provision a Media Player.

i **Note**: Media Player pre-provisioning is optional.

Process Overview

The warehousing process covers devices received in any of the following ways:

- A newly manufactured device received at the MSO warehouse direct from the manufacturer or RMA center.
- A device removed from a subscriber's home and delivered to the MSO warehouse by a technician.
- A subscriber returned the device to an MSO contact center, which was then delivered to the MSO warehouse.

Regardless of the origin of the device, the warehousing process has two phases with a reboot in between. The phases are:

Phase 1

- Verify the devices' installed firmware version in both the primary and secondary partitions against the targeted firmware, and perform a firmware upgrade if necessary.

  Phase 1 ends with a required reboot.

Phase 2

- After the reboot, Phase 2 begins with erasure of all previous customer settings. If a firmware update is necessary, the firmware upgrade is performed on the primary partition.

The pre-provisioning process is designed for multiple devices; a typical configuration is 5 racks with up to 20 devices each. Not including connecting and disconnecting, the entire process takes up to 30 minutes.

Preparing a New Device

Follow these steps to prepare a new or repaired Media Player device for pre-provisioning.

1. Unpack and inspect received Media Players according to local practices. Contact the shipper if a received device appears to be damaged.
2. Scan or upload device information into inventory.
3. Proceed to Pre-provisioning Procedure.

Preparing a Technician-returned Device

Follow these steps to prepare a Media Player returned to the warehouse by a technician.

1. The technician should perform the following steps:
   a. Remove the device from the previous subscriber's account.
   b. Associate the device with the TECH buffer.
   c. Return the device to the warehouse.

   The following preparation is performed at the warehouse.

2. Scan the bar code on the device and assign warehouse status to the device.

3. Proceed to Pre-provisioning Procedure.

Preparing a Subscriber-returned Device

Follow these steps to prepare a Media Player returned to a retail site by a subscriber.

1. The retail site should perform the following steps:

   a. Remove the device from the previous subscriber's account.

   b. Assign front counter status to the device.

   c. Return the device to the warehouse.

   The following preparation is performed at the warehouse.

2. Scan the bar code on the device and assign warehouse status to the device.

3. Proceed to Pre-provisioning Procedure.

Media Player Warehousing Requirements

The following is required for pre-provisioning the Media Player:

- A warehouse trigger USB flash drive plugged into an open USB slot to trigger the warehousing process. See the following sections for details.
- Ethernet connectivity to the ARRIS Portal and access to the ARRIS AHS
- ARRIS Media Player
- ARRIS Portal warehouse Context Settings and software Target

USB Flash Drive Setup

To set up a USB flash drive for warehousing add a file called "trigger_warehouse" with no extension to the root directory of the drive. The file needs to contain two lines as follows:

CONFIG_CONTEXT=*context string* *

CONFIG_WAIT_FOR_CM_UPDATE=1

*Replace *context string* with the context string value defined within the ARRIS portal MSO Infrastructure tool for the warehouse defined. Contact your ARRIS Deployment Engineer for the correct context string.

Note: If using a USB flash drive, a flash drive (prepared per the instructions) is required for each Media Player in the warehousing rack.

Media Player Warehousing

Use the following process to warehouse all ARRIS Media Players.

1. Place Media Player in the warehouse staging area

2. Connect Ethernet and power into the back of the Media Player
3. Insert the USB Drive into the USB port.

ℹ️ MP2000 has a USB port on the front and back and the MP2050, MP2150, and IP815 have one on the rear only. Any USB port can be used for loading the trigger file.

MP2000 and 2150 rear panel

USB Port   Ethernet   Power

MP2000 front panel

USB Port

MP2050 rear panel

USB Port   Power

IP815 rear panel

USB Port   Power
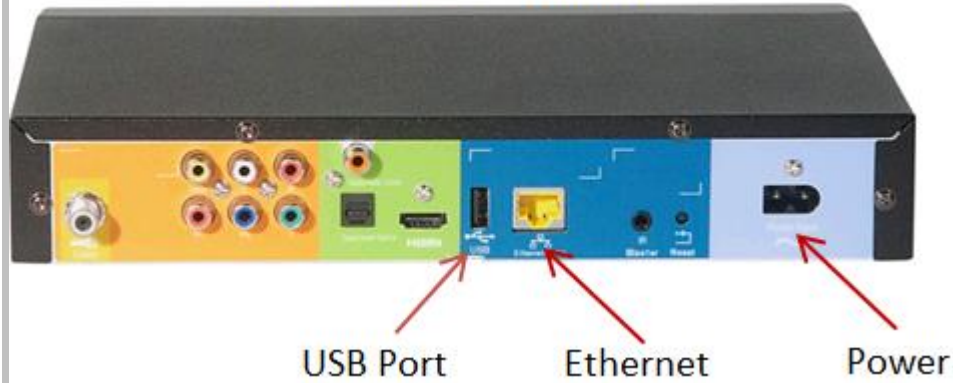
4. The Media Player contacts the ARRIS Portal, downloads the warehouse context settings that redirect the Media Player to the AHS (ARRIS Headend Server), and downloads the warehouse target software version. This process also deletes any previous customer settings and then reboots and downloads a second copy of the warehouse target software version.

5. The MP2000 and MP2500 Media Players both have a front LED display that reads "End" when the process is complete.
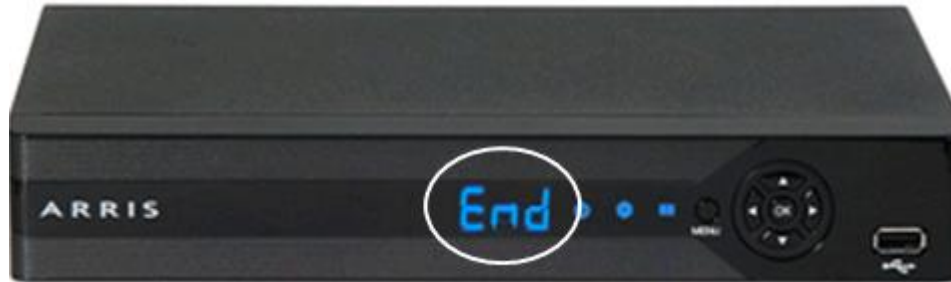
6. The MP2050 and IP815 Media Players do not have an LED display and status of the warehousing process is displayed using lights on the front panel.

MP2050

IP815
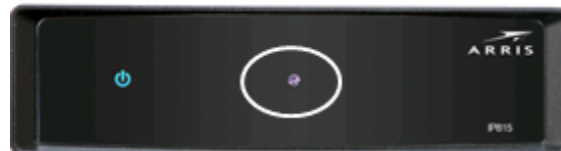
The following is an illustration of the LED patterns and their meanings.

Phase	LED sequence				
Process not started	—	—	—	—	—
Startup and normal processing	•	—	•	—	•
Error condition	•	•	—	•	•
Process complete	•	•	•	•	•

MS4000 Media Streamer Warehousing Process

The MS4000 Media Streamer allows a mobile client to playback video transcoded from the Media Gateway. It is an optional configuration which requires that the household account is provisioned with the "transcoder" rate code in order to use the feature.

Use the following procedure to pre-provision and MS4000 Media Streamer.

Note: MS4000 Media Streamer pre-provisioning is optional.

Preparing a New Device

Follow these steps to prepare a new or repaired MS4000 Media Streamer device for pre-provisioning:

1. Unpack and inspect received MS4000 Media Streamer according to local practices. Contact the shipper if a received device appears to be damaged.
2. Scan or upload device information into inventory.
3. Proceed to Pre-provisioning Procedure

Preparing a Technician-returned Device

Follow these steps to prepare an MS4000 Media Streamer returned to the warehouse by a technician:

1. The technician should perform the following steps:
   a. Remove the device from the previous subscriber's account.
   b. Associate the device with the TECH buffer.
   c. Return the device to the warehouse.
2. Scan the bar code on the device and assign warehouse status to the device.
3. Proceed to Pre-Provisioning Procedure.

Preparing a Subscriber-returned Device

Follow these steps to prepare an MS4000 Media Streamer returned to a retail site by a subscriber:

1. The retail site should perform the following steps:
   a. Remove the device from the subscriber's account.
   b. Assign front counter status to the device.
   c. Return the device to the warehouse.
2. At the warehouse, scan the bar code on the device and assign warehouse status to the device.
3. Proceed to Pre-provisioning Procedure.

MS4000 Media Streamer Pre-provisioning Procedure

No special process is required to warehouse (pre-provision) this device. This device has a factory reset button in the back, but it is not necessary to reset the device during warehousing. The software version is targeted using configuration from the ARRIS Services Portal.

When the MS4000 Media Streamer is plugged into the Ethernet port of the Media Gateway, it will automatically upgrade to the targeted software version after update account is executed and the Media Gateway is rebooted as part of the installation process.

Installing Whole Home Solution Devices

ARRIS Media Gateways include both "headless" (MG5xxx) and "headed" (DCX3635) gateways. Headless gateways require at least one media player in order to play video while headed gateways can connect directly to TVs without requiring a media player.

MG5xxx Installation

An installation of The ARRIS MG5xxx consists of:

- One Media Gateway
- One or more Media Players
- One MS4000 Media Streamer (optional)

The Media Gateway should be placed off the first splitter at the cable entrance to the house. An additional splitter may need to be added for the remainder of the cable network.
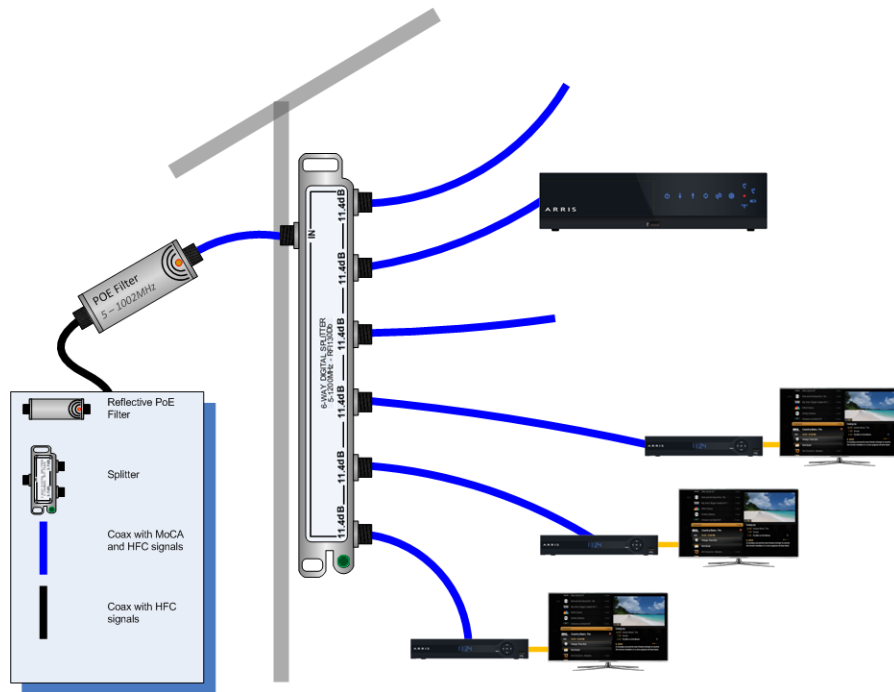
DCX3635 Installation

An installation of the ARRIS DCX3635 consists of:

- One DCX3635 Media Gateway
- One or more Media Players (only for multi-room installations)
- One MS4000 Media Streamer (optional)

While the The MG5xxx was typically installed at or near the home demarcation point, the DCX3635 will be installed near a television display. Consider the goal of optimizing DOCSIS signal quality and the MoCA network controller when deciding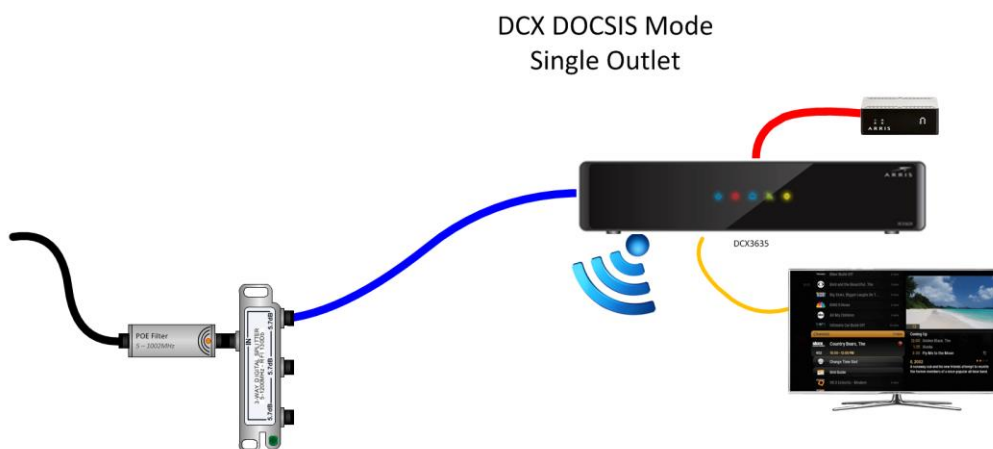 where to install the DCX3635. Place the DCX3635 in the home in order to provide the best Wi-Fi footprint. The coaxial outlet that the it connects to should be a home run from the splitters at the demarcation point using the lowest loss position on the splitter network.

DCX DOCSIS Mode
Single Outlet

DCX3635 Installation Tips

- If installing a DCX3635 as a standalone device in the home, you should still install a MoCA filter at the home demarcation point to allow later self-install service upgrades.
- The DCX3635 supports self-installation when MoCA is disabled.
- If connecting other devices over Wi-Fi, carefully select the installation location relative to the other devices in order to maximize signal coverage.
- Note that the 5 GHz WiFi channel is used to connect IP815s to the DCX3635 for streaming TV/video. High speed data usage of the 5GHz band may cause interference with WiFi streaming video.
- A maximum of two IP815s are recommended when connecting to the DCX3635 over WiFi.
- Connecting MP2xxx or IP815 Media Players is supported over MoCA.
- Tandem modem configuration requires an external router.

- The DCX3635 does not support telephony.

Installation Overview

The installation process includes the following steps:

1. Call in to add devices to billing and provisioning tools. Verify the Media Gateway is provisioned.
2. Install a reflective MoCA filter at the house entrance.

   Note: Some MSOs will force MoCA as the only option for communications between Media Players and the Media Gateway. This is accomplished by a context setting called MocaOnly. If this setting is not present, the install or subscriber is free to choose either MoCA or Ethernet or a mix of the two.

3. Install the Media Gateway in the desired location. Verify DOCSIS registration and connectivity.
4. Connect telephones if included in order. Verify functionality (dial tone, make and receive calls).
5. Configure and test wireless and Ethernet connectivity, according to local practices.
6. Install Media Players in desired locations.
7. Verify functionality of all components.

An installation dashboard is built into each Media Player, and can be used to manually configure channel maps and headend information if needed. This procedure describes the use of the installation dashboard for initial setup and diagnostics.

About the Installation Dashboard

The installation dashboard is an application on the Media Player that provides the status of items critical to the installation and access to the Diagnostics application.

During installation, if the channel map was not set through the MSO's billing system, the Installation Dashboard automatically launches when attached Media Players start up. (Make sure the Media Gateway is provisioned .) If the installer wants to access Installation Dashboard to check the status of the installed devices, it can be manually accessed from any Media Player.

If the Media Player does not automatically start the Installation Dashboard, start it manually as follows:

1. Using the remote, open the Menu, navigate to the Settings category, and scroll to the Channel List card.
2. With the Channel List card in center focus, press the following buttons within three seconds: back, next, back, next.
3. Proceed to Setting the Headend and Channel Map.

◀ This Media Player ▶		Last Updated: Thu Sep 24, 02:40:39 PM

Device: 3CDFA99D8932 - Provisioned

Connection: Ethernet

LAN Status: Passed

Account Settings: Last Updated: Sep 24, 2015 08:19AM

Product Family Version: 3.0.5

Software Update: 7.2.2.19X7Q-S.457247, Current

Resource Download: Last Updated: Sep 24, 2015 01:24AM

Logs Uploaded: Last Uploaded: Sep 21, 2015 03:43PM

Reboot Status: Reboot Not Required

- close dashboard
- go to diagnostics
- reconnect to LAN
- update account settings
- update software
- update resources
- upload logs
- reboot now

Installation Dashboard Options

If a headend location and channel map have not been set on the customer account, the Installation Dashboard menu includes the following options:

Location: Selects a Headend.

Channel Map: After selecting a Headend, displays the Channel Map options.

Confirm Changes: Saves changes made to the Location and Channel Map options.

After saving the settings, the Media Player sends the settings to the Portal. If successful, the Media Player is notified. The Media Player then notifies the Media Gateway which does the following:

1. Downloads the latest context settings to pick up the new Location (Headend) and Channel Map.
2. Begins EPG and VOD downloads.
3. Notifies all Media Players on the network that installation is complete.
   - The Media Player used by the Installer displays confirmation that the installation is complete and that EPG/VOD downloads are running.
   - All other Media Players download the latest context settings and close their Installer Tools.

Finishing Video Installation

At this point, the Media Player and Portal automatically complete the installation. Verify the following actions and use the Diagnostics Tool if necessary to correct any problems.

Note: Be sure to tune all Media Players to high bit rate channels to confirm that the installation is successful.

Installing the MS4000 Media Streamer

If an MS4000 Media Streamer is required for the installation, connect it to an Ethernet port of the Media Gateway after the Media Gateway and Media Player(s) are successfully installed.

Installation Overview

The main requirement for installation of this device is establishing Internet connectivity so that it can communicate with the Sling Portal to determine the software version to use. The MS4000 Media Streamer does NOT need factory-resetting even if it was provisioned to a previous account and re-deployed to a different customer.

The MS4000 Media Streamer can be installed in either of these two states:

- Factory default—out of the box from the manufacturer or factory reset.
- Previously owned—in working condition, returned to home office from previous user.

In either state, once the Media Gateway has Internet connectivity, the MS4000 Media Streamer attempts to contact the Sling Portal to download the necessary software. A series of blinking LED patterns display representing the various sequences that the MS4000 Media Streamer is going through.

When the LED light sequences have completed, the "power" and "network" LEDs are both in a constant "ON" state indicating that the MS4000 Media Streamer has linked with the Media Gateway and has Internet connectivity.

Verifying MS4000 Media Streamer Status

MS4000 Media Streamer status information is available on the Diagnostics page in the Installer Tool. The Media Streamer card displays the following information to verify a successful installation:

- Status should show "Online"
- IP Address/Port
- Port Forward Configuration
- Software Version
- Software Target
- Hardware Version
- Finder ID

- Stream IDs

LED Sequences – Factory-default State

If the MS4000 Media Streamer is in a factory-default state, it may need to download the latest software based on the hardware version and target specified by the Sling Portal. Below are the LED sequences that display when firmware updated is needed.

LED Sequences - Factory-default State

Sequence	Network LED	Streaming LED	Scenarios	User Action
1	BLINK_500ms	BLINK_500ms	If LEDs are blinking alternately - CBFU firmware download is in progress -------------------- If LEDs are blinking together - CBFU firmware installation is in progress	Wait for download to complete, do not reset or power cycle. **There may be a long wait after this before the next sequence happens.**
2	BLINK_5000ms	OFF	MS4000 Media Streamer linking with MG is in progress.	If LED remains in this state for > 30 seconds, the MS4000 Media Streamer may not have obtained a WAN port. Use the MP's diagnostics to verify that the MS4000 Media Streamer's WAN port. **Rebooting the MG and MS4000 Media Streamer may help.**
3	BLINK_2000ms	OFF	Link with MG is established. MS4000 Media Streamer is waiting for internet connectivity while boot up.	If LED remains in this state for > 30 seconds, check internet connectivity through MG
4	ON	OFF	MS4000 Media Streamer is in Idle state with established MG Link and internet connectivity	Factory-reset completed. **It may need to repeat these sequences a second time before it's completely finished.**

ARRIS Contacts

Technical Services

For technical support on ARRIS products you can contact us by phone or on the web.

By Telephone   The Technical Assistance Center can be reached at:

1-888-944-HELP (4357)

On the Web   The Ask ARRIS web site gives you web access to service and support tools. You will need to register using your support contract ID and email address. Ask ARRIS is located at:

http://www.arris.com/support

There you will be able to access:

- Support Contact Information for all products
- Knowledge Base Information (also known as Solutions)
- User Documentation
- Current open support cases
- Ability to create a new support case (for technical support or repair and return)
- Training Webcast

By Email   Email addresses for ARRIS products will be provided with your account at Ask ARRIS.

Technical Training

For more information about our Global Knowledge Services Department and the programs we offer, e-mail us at:

training@arris.com