netReady™ Technical Support Guide

Providing Technical Support for your netReady Equipped TV

Version 2.0.3

UpdateLogic Incorporated
508-624-8688 (TEL)
508-624-8686 (FAX)
http://www.updatelogic.com

Thank you for using the UpdateTV netReady™ software update solution. UpdateLogic Incorporated provides a comprehensive, cost-effective mechanism, which can update the complex firmware within a digital television by sending firmware updates over the Internet, digital broadcast infrastructure, and via USB.

If you find any problems with this software, please report them via email to techsupport@updatelogic.com.

Please visit our website at www.updatelogic.com for the latest news and information.

UpdateLogic Incorporated

508-624-8688 (TEL)

508-624-8686 (FAX)

contact@updatelogic.com

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1 NetReady Technical Support Guide

This document is designed to introduce UpdateTV's netReady technology to a consumer electronic manufacture's (CEM) technical support staff prior to product rollout. It provides a system overview, describes the NOC interface, and outlines technical support protocols that are designed to help the customer solve their UTV-related connected TV problems. When a CEM is ready to go to market ULI will customize this document to the specifics of their TV.

1.1 Disclaimer

The information contained in this document including the screen shots, etc. are preliminary and subject to change. Changes in details due to customer feedback, improvements, or bug fixes should be anticipated, but the general framework of the netReady Agent and Network operations are substantive and not expected to change.

1.2 Change Tracking

Version Number of This Document	**Changes**
2.0.3	Ported to netReady document template
2.0.2	New Update Coordination and OSD Information sections.
2.0.1	First preliminary flesh out.
2.0.0	Original – preliminary outline

1.3 Scope

This document assumes that the reader is *not* familiar with UpdateTV technology, but is well versed in digital television technology including digital receiver architecture, Internet and MPEG protocols, and general connected TV concepts. This document does *not* describe creating or managing updates or any issues related to porting the Agent or using the UpdateTV tools.

1.4 Audience

This document is designed to be read by a CEM's technical support staff, documentation staff, and their management

1.5 Related Documents

All UpdateTV documents are distributed with the UpdateTV SDK. The UpdateTV SDK is distributed with documentation that appeals to a wide audience. Only the most technical staff members need to read all the documentation. The selection of documents below is deemed to be most appropriate for the technical support staff.

Document	Topic	Source
netProvision Technical Guide	Description of netProvision function and connected device integration. Useful to all audiences.	ULI
netReady Intro	General introduction to the UpdateTV technology. Useful to all audiences.	ULI
netReady Agent Integration Requirements	Target software and hardware requirements for your netReady device.	ULI
netReady Agent Porting Instructions	Step by step porting instructions for the Agent. Useful to receiver Agent porting engineers.	ULI
netReady Agent Validation Guide	Description of tests the CEM should run to validate their port of the netReady Agent to a CTV. Useful to all audiences.	ULI
netReady Factory Process Guide	Introduces netReady technology to your factory staff prior to production	ULI
netReady Technical Support Guide	Introduces netReady technology to your technical support staff prior to production	ULI
netReady NOC User's Guide	User's manual for interacting with the Network Operating Center via its web interface. Useful to carousel development and test engineers.	ULI
netReady Publisher	User's manual for the Publisher utility. Useful to all audiences.	ULI
netReady Technical Support Guide	An introduction to netReady and supporting CTVs for a CEM's technical support organization.	ULI
netReady Factory Process Guide	An introduction to netReady and manufacturing CTVs for a CEM's factory staff.	ULI
UpdateTV TestCarouselBuilder	User's manual for the TestCarouselBuilder utility. Useful to all audiences.	ULI
UpdateTV TSFactory	User's manual for the TSFactory utility. Useful to technology evaluators and engineers supporting factory updates.	ULI
UpdateTV StreamViewer	User's manual for the StreamViewer utility. Useful to all audiences.	ULI
UpdateTV Factory Update Guide	A document that explains the use of factory mode from an operational and programmatic point of view. Useful to technology evaluators and engineers supporting factory updates.	ULI
UpdateTV A/97 Implementation Specification	UpdateTV implementation of A/97 download data service. Useful to technology evaluators and advanced users.	ULI
ATSC A/97: Software Download Data Service	ATSC spec. Useful to technology evaluators and advanced users.	ATSC

http://www.atsc.org/standards.html		
ATSC A/90: Data Broadcast Standard http://www.atsc.org/standards.html	ATSC spec. Useful to technology evaluators and advanced users.	ATSC

1.6 Glossary of Terms

Term	Description
API	Application Programming Interface.
ASI	Asynchronous Serial Interface, often used to distribute MPEG transport streams.
ATSC	Advanced Television Standards Committee. www.atsc.org
Back End	MPEG decode, graphics and user interaction portion of the digital receiver hardware.
BEM	Broadcast Encoder Monitor. A 1U rack mount device that accepts ASI or SMPTE DTV MPEG data in and inserts the UpdateLogic broadcast carousel. Also contains an RF input to monitor the resulting output. This device is installed at both broadcast sites and in customer labs.
CableLabs	Research and development consortium that is dedicated to helping its cable operator members integrate new cable telecommunications technologies. www.cablelabs.com
CAB File	An archive file like a ZIP file that contains one or more files in compressed format.
CEM	Consumer Electronics Manufacturer
CHM	Customer's Hardware Model
Component	A separately updateable element within an update.
CMG	Customer's Model Group
Content Service Provider	Content Service Provider. For instance, Netflix, Vudu, Amazon, CinemaNow, etc.
Connected Device	A device such as a TV or Blueray player that supports an Ethernet and/or WiFi connection to the internet and uses that connection to connect to services like streaming media, news, weather, etc..
COUI	Customer's Organizational Unique Identifier
CSP	Content Service Provider.
DCR	Digital Cable Ready. This acronym refers to consumer electronic devices equipped with Digital Tuners and Cable Card slots for use in receiving one-way Digital Cable signals and features.
Front End	Tuner and demodulation portion of the digital receiver hardware.
Hardware Model	A number describing a sub-set of a model group that is usually panel size specific.
HM	Hardware Model

HMR	Hardware Model Range
Image	An entire software or data entity that is broken into pieces called “modules” when broadcast on the network.
Manufacturers’ ESN	A serial number that is readable by software and also printed on a label affixed to the outside of a TV. Used by the consumer to identify their TV to technical support staff. Each CEM has a different serial number scheme. The customer can display the serial number by using the TV’s menus. Also called “the SN”.
Manufacturer’s Software Version	A string that contains version information like “TV_System_3.7”. The customer can display the software version using the TV’s menus.
Model Group	A number that uniquely defines a particular TV model within a give OUI (company). A model group may be sub-divided into different hardware models.
MG	Model Group
Module	Name of the distribution unit that a software or data “image” is broken down into in order to broadcast it efficiently on the network.
MV	Module Version
netProvision	A facility that is part of netReady used for delivering streaming media security credentials to a TV.
netReady	A suite of connected device services that includes netUpdate, netProvision, netRegister, and netDiag.
netReady Agent	Software embedded in a digital TV receiver to enable the reception of software updates via the Internet, Broadcast, and USB.
netUpdate	A facility that is part of netReady used for delivering security credentials to a device in the consumer’s home.
NOC	The UpdateTV Network Operations Center. A server farm that distributes updates over the Internet and broadcast networks.
NOC Web Interface	A web-based application that is used to manage updates and provisioning over the UpdateTV Network. The URL for this application is extdev.updatelogic.com for the development NOC and support.updatelogic.com for the production NOC. Often called simply “the NOC”.
OAD	Over Air Download (update via terrestrial RF broadcast).
OOB Testing	Out Of Box Testing
Open Cable	Standards organization setting standards for Open Cable networks and related technology. http://www.opencable.com
OTA	Over The Air (i.e. Terrestrial Broadcast).
OUI	Organizational Unique Identifier
PSI	Program Specific Information. Generally refers to the PAT, PMT, CAT, NIT, and TDT tables in an MPEG

	stream.
PSIP	Program and System Information Protocol. Generally refers to the STT, MGT, VCT, RRT, EIT, ETT, and DCCT tables in an MPEG stream.
Publisher	A command line tool provide by UpdateLogic for the purpose of packaging a set of modules for software distribution.
Registration	The process that all TVs go through when they first connect to the Internet after shipment in order to register their identity with the UpdateLogic NOC and get a network identity. During this process the device's serial number is sent to the NOC and it receives a ULID that is used for all subsequent conversations with the NOC.
Re-registration	A process that can be initiated via the NOC web interface by support staff in order to force a TV to re-register and receive its security credentials again.
Registration	The process that all TVs go through when they first connect to the Internet after shipment in order to register their identity with the UpdateLogic NOC and get a network identity. During this process the device's serial number is sent to the NOC and it receives a ULID that is used for all subsequent conversations with the NOC.
RTOS	Real Time Operating System.
Security Credential	A TV-unique or model group-common file that a TV must be provisioned with in order to use the associated streaming service that relies on it.
Streaming Service	An application that provides streaming video or audio.
StreamViewer	A software tool supplied by UpdateLogic to view and analyze file based transport streams that contain compatible carousels.
SV	Software Version
SVR	Software Version Range
Update	An entity containing multiple components that may be software or data that replaces the components that were shipped with the TV. Used to fix bugs and add features.
UpdateTV Agent	Software embedded in a digital TV receiver to enable the reception of software updates via the UpdateTV Network.
UpdateTV Network	A collection of networked data insertion servers, and related broadcast equipment, used to distribute software updates to UpdateTV enabled receivers. The network provides for distribution via over-the-air and Open Cable digital networks environments.
UpdateTV Receiver	A digital television receiver enabled with the UpdateTV Agent so as to receive software updates from the UpdateTV Network.
UpdateTV Server	A computing device used to generate a data stream that can be multiplexed with other digital program content at a

	broadcast facility for inclusion in the ATSC broadcast stream.
TestCarouselBuilder (TCB)	A Win32 GUI based tool that creates test carousel transport streams from template test files and Publisher packaged software updates.
Unit Under Test (UUT)	The CEM's target receiver that is being tested.

2 Troubleshooting Connected TVs – An Introduction

In an ideal world this manual would be unnecessary. Connected TVs would ship feature complete, bug-free, never be prone to security risk, and consumer's Internet connections would all be 5Mbps+, never be effected by wireless interference and work reliably all the time. Unfortunately, this is not the case. In the real world, connected TVs present a troubleshooting challenge. Not only are the various components of a TV connected to the Internet via a link with a great deal of variation in quality, but the components are connected to each other as well. This document seeks to clarify the significance of Internet connection quality, establish the relationship of the components, and spell out practical steps for solving common problems. Although connected TVs are complex, netReady is designed to make them easy to support.

3 What is netReady?

NetReady is a suite of technologies that enable a CEM to update the software, data, and security credentials of a TV after it ships, store registration information, and acquire real-time diagnostic information to help troubleshoot problems. This section provides a brief synopsis for each of these technologies.

3.1 Updating TV Software

NetUpdate is responsible for adding features and providing bug fixes after a TV has shipped. NetReady takes advantage of three types of update delivery mechanisms: Internet, Broadcast, and USB.

3.1.1 General Information about Updates and Software Versions

Internet and broadcast updating occurs automatically and invisibly when the TV is powered off using the remote's power key. Due to concerns about simplifying the support matrix and security agreements with streaming media partners there is no way for a TV update to be rolled back. It's a one-way operation. If bugs are found in a recent update another update will be made to fix those bugs and the system will be updated again. When an update is complete the user will be notified that their TV software has been updated and the version string and a brief release note will be displayed. The current version string id displayable in the …. menu. If a TV is left powered up then it will not receive updates.

3.1.2 Internet Updates

When the TV is powered down it checks for Internet updates first. An time an internet update takes to complete is dependent on the size of an update and the consumer's internet connection speed.

3.1.3 Broadcast Updates

If the NOC cannot be reached the best case time for delivering a broadcast update is 2.5 hours. The worse case time is 5.5 hours given the current load on the UpdateTV broadcast carousel. If the TV is power on during a broadcast update it saves the amount of data that it has received so far. When the TV is then powered down again the broadcast update picks up where it last left off. On TVs that are left powered up and down many times per day it may take a few days for the TV to receive an update. Updates do not affect the function of the TV until all of the parts of the update are received. Broadcast update channels are identified during the channel scan that takes place during onboarding. If a TV is moved to another city, the channel that the broadcast Internet updates occur automatically when the TV is shut off.

3.1.4 USB Updates

Updates can be delivered by USB. A consumer may download an update from a website and place it on the USB themselves or a USB stick can be mailed to them directly from the CEM. USB updates are unlike broadcast and Internet updates because they're initiated by plugging a USB stick into the TV when the TV is powered-up. The TV will check the USB stick for a new update and if it finds one it will tell the consumer about the version of the update it just found and will then power down automatically to receive the update. USB updates take 45 seconds to complete although the total time will be a little more because the TV has to power down to get the update and then power back up to install it once it's been received.

3.2 netProvision

netProvision is a facility that manages streaming media security credentials on a connected TV. Streaming media services like Netflix, Amazon, and Rhapsody require security credentials to authenticate and secure the streaming media they send to the TV. When a TV is first powered on in the consumers home, as soon as the TV receives a valid IP address it, netProvision will contact the NOC and download the security credentials required to for the streaming services that the TV is capable of running. netProvision keeps those security credentials updates and can revoke them as well. The operation of netProvision is transparent to technical support operation staff expect that support technicians may want to check the NOC's "View Device Information" page to see if the device has been provisioned while trouble-shooting a customer problem.

3.3 netRegister

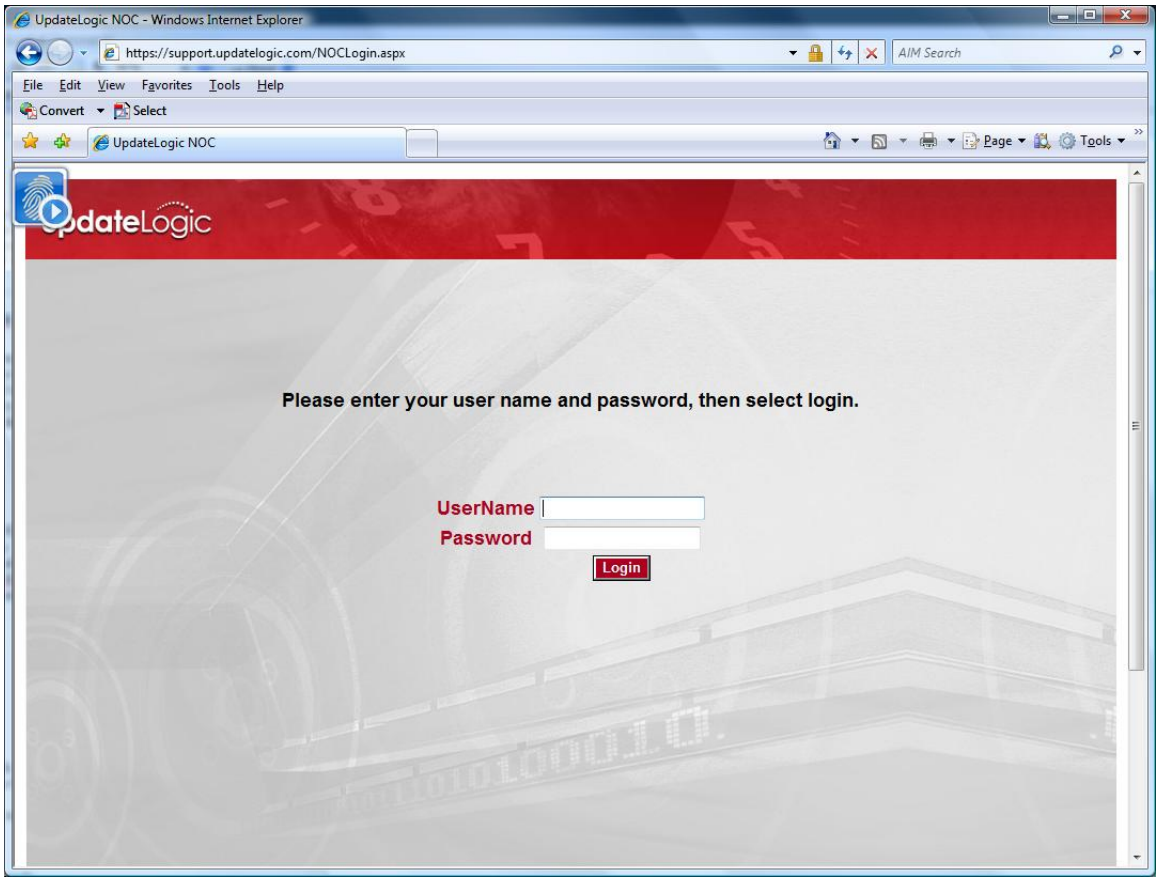
netRegsiter is a facility that stores registration information on the UpdateTV NOC when a consumer first registers their TV during the onboarding process. If an Internet connection is not available during registration, the information is stored on the TV until an Internet connection is made. The NOC does not display this information due to privacy concerns. Instead a CSV file containing the gathered information is sent to the CEM every month. Currently the information returned in the netRegister registration record includes Serial Number, First and Last Name, Phone Number, e-mail address, and Zip Code. More information can be collected during registration if need be.

4 Using the UpdateTV NOC

The UpdateTV NOC ("the NOC") is accessed via the url support.updatelogic.com. The NOC provides control over the UpdateTV agents running on the CEM's connected TVs, assigns updates to the network, and displays diagnostic information about TVs that have registered. Each

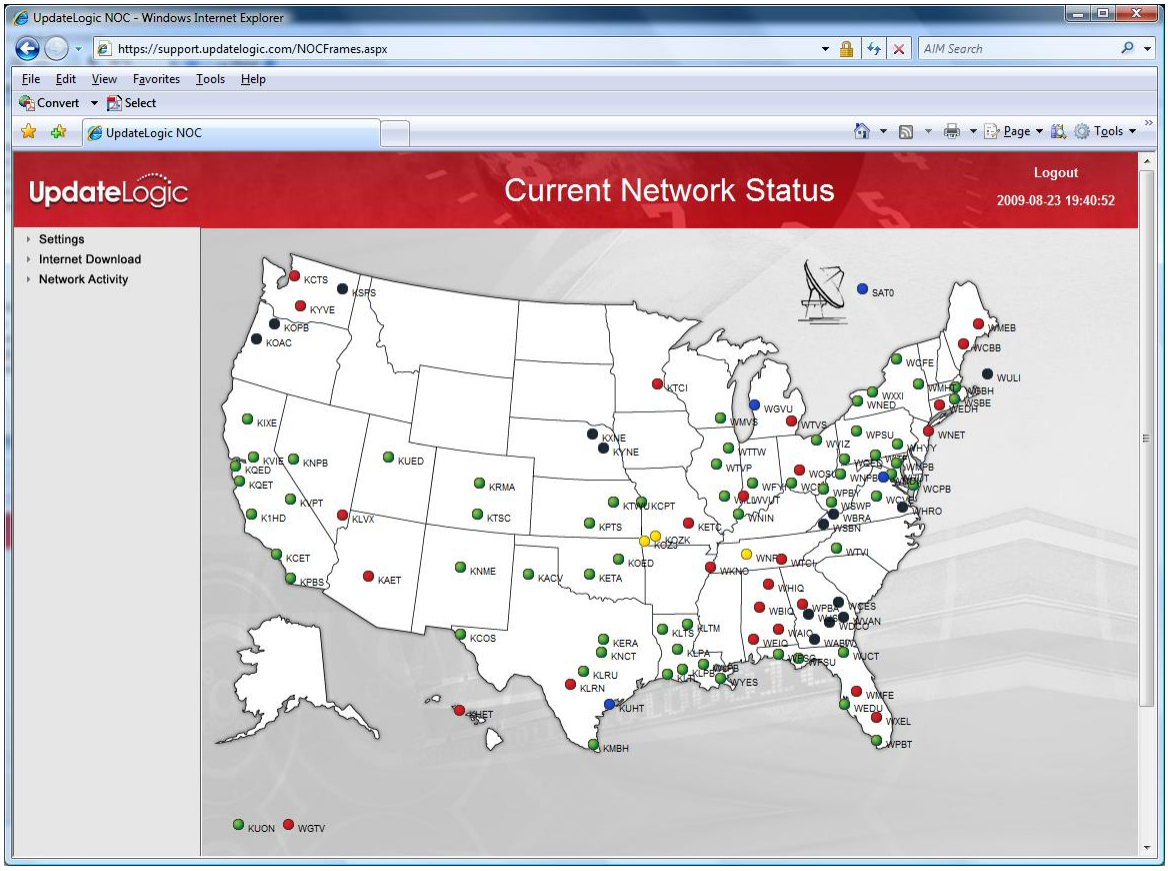
user of the UpdateTV NOC has their own login credentials. Logins are tracked by the NOC's database. The CEM should request a login for each of the employees in their technical support staff who will have access to the NOC. When you navigate to the NOC web page you will be presented with a log in screen.

4.1 NOC Login Page



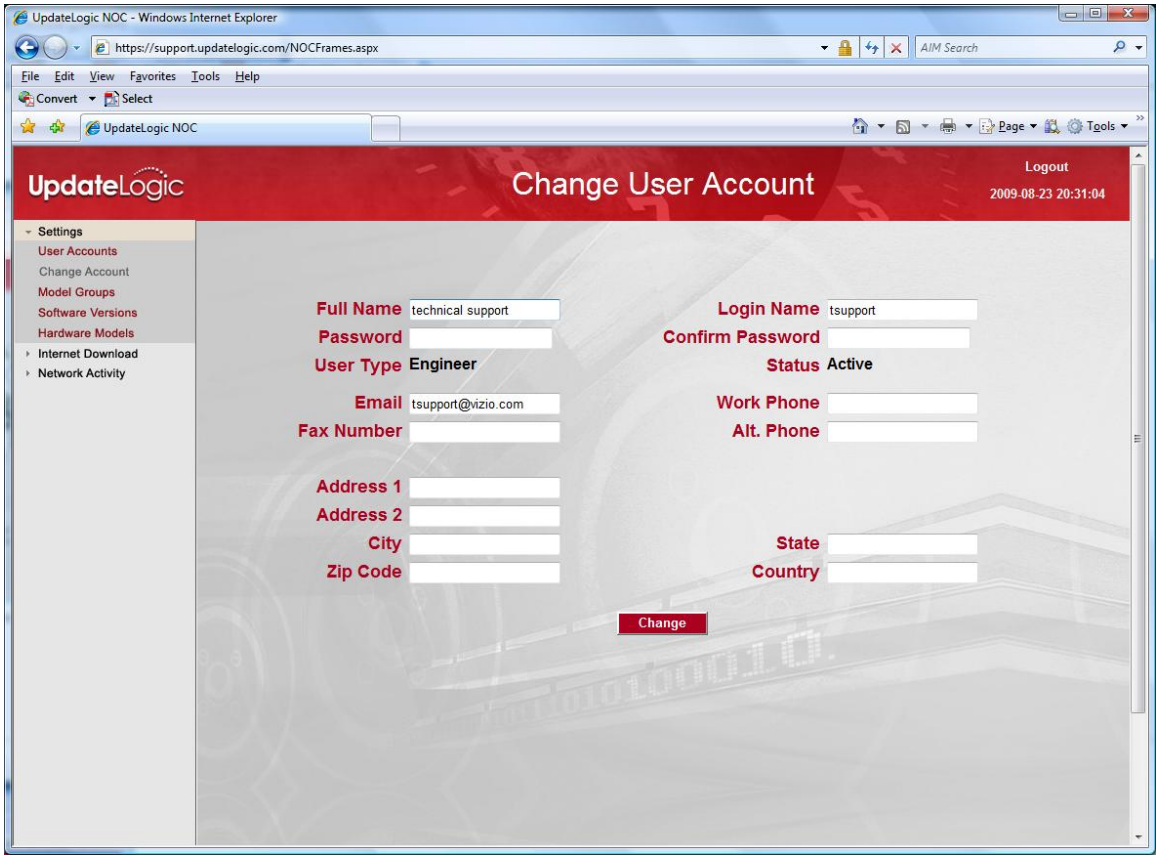
Once you enter a valid user name and password you will be placed into the main NOC menu:

4.2 Main Menu - Current Network Status



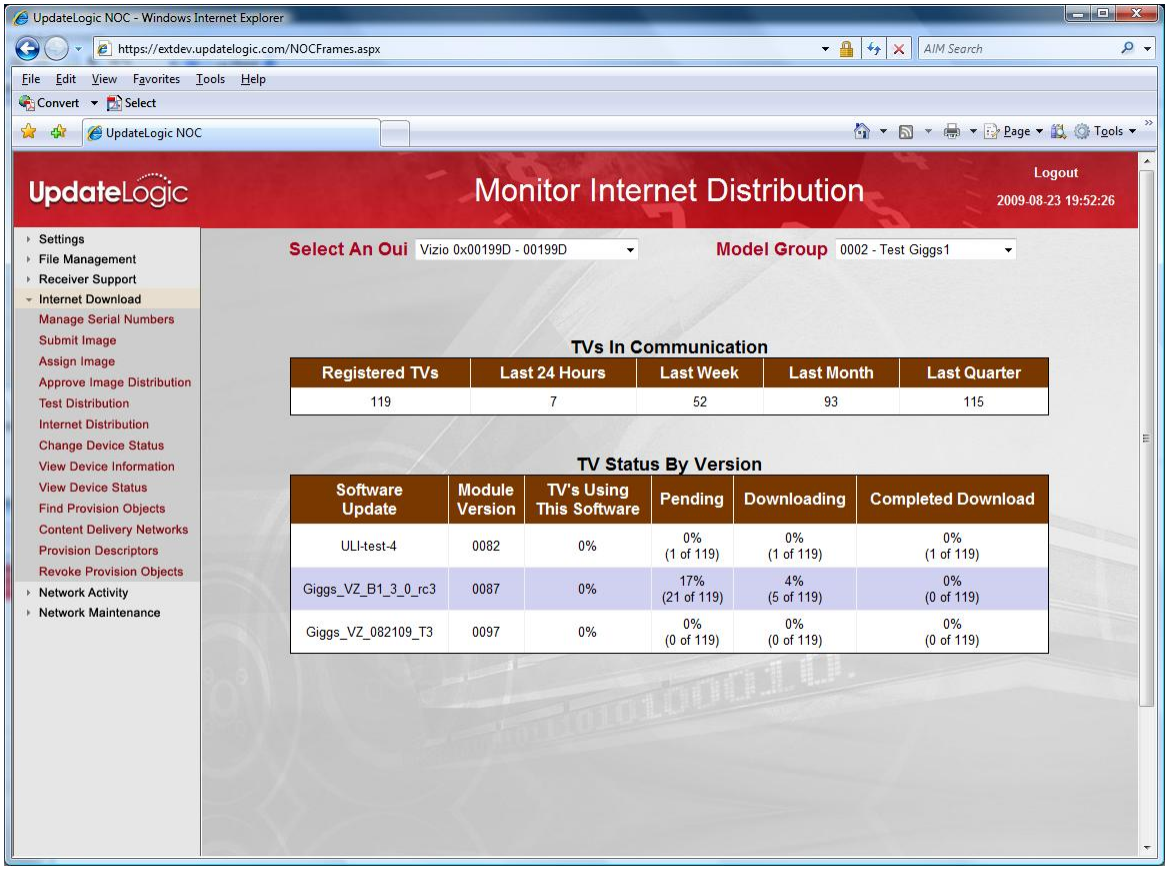
This page displays the status of the nationwide broadcast network and allows you to navigate to the following pages.

4.3 Settings->Change Account



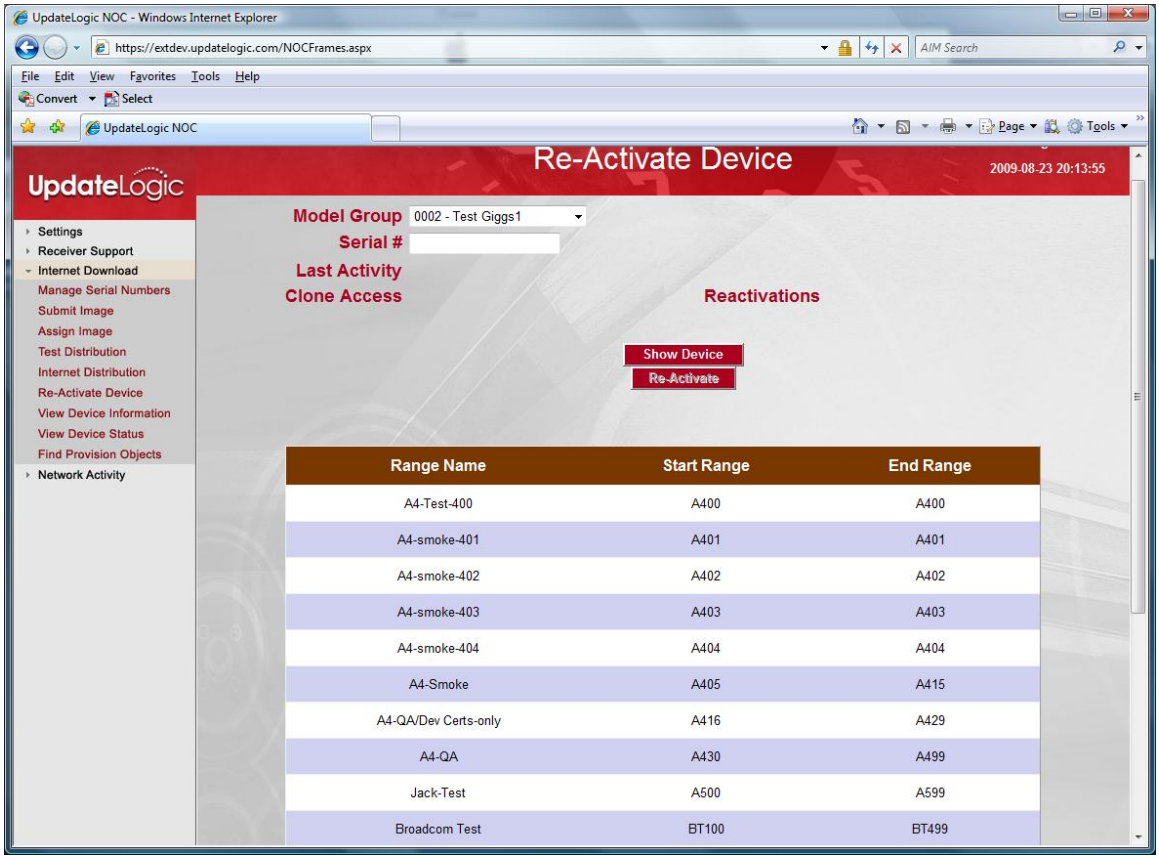
This page allows you to change your password.

4.4 Internet Download->Monitor Internet Distribution



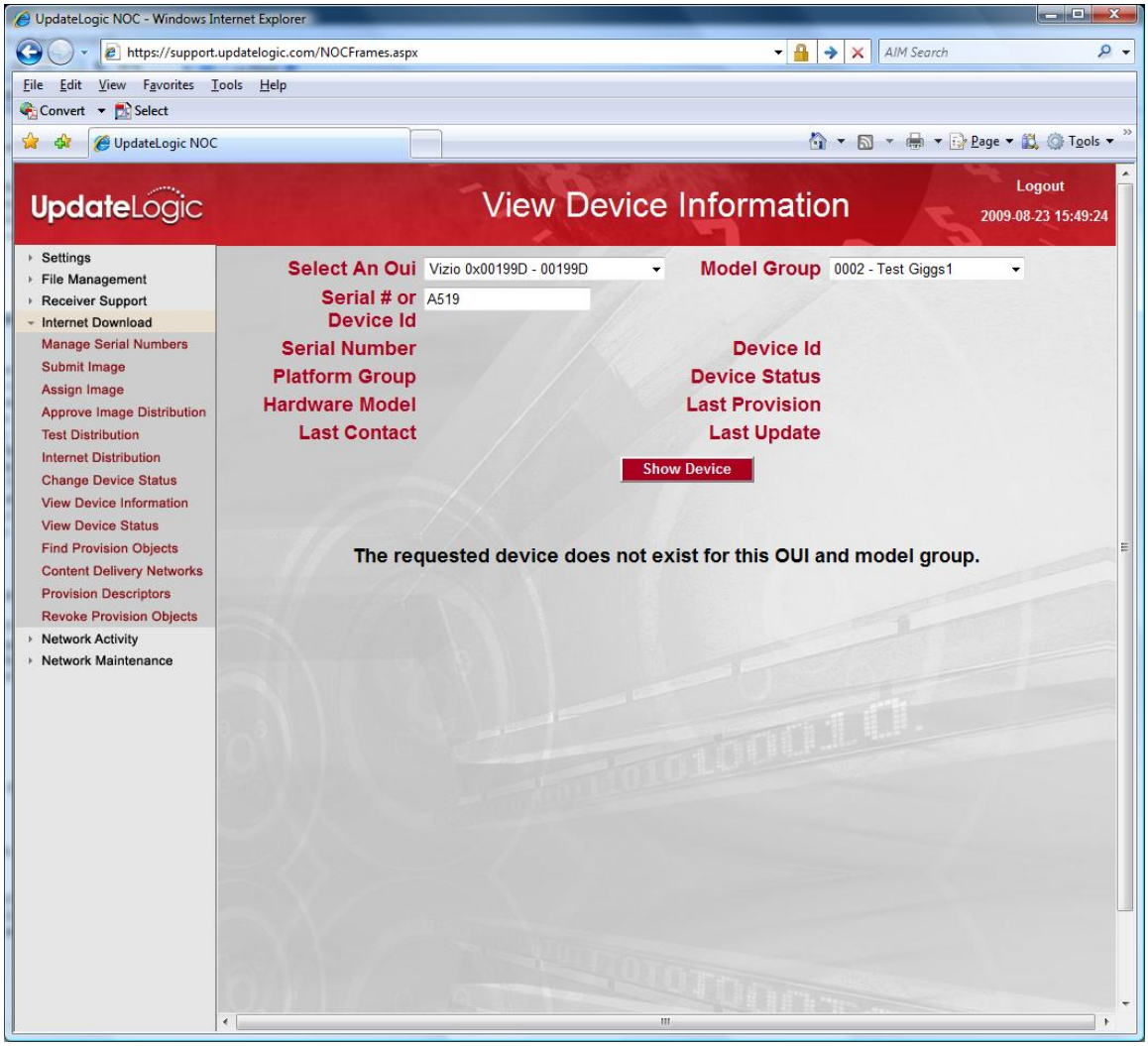
This page allows you to monitor the progress of all updates that are currently active on the Internet download network.

4.5 Internet Download->Re-Activate Device

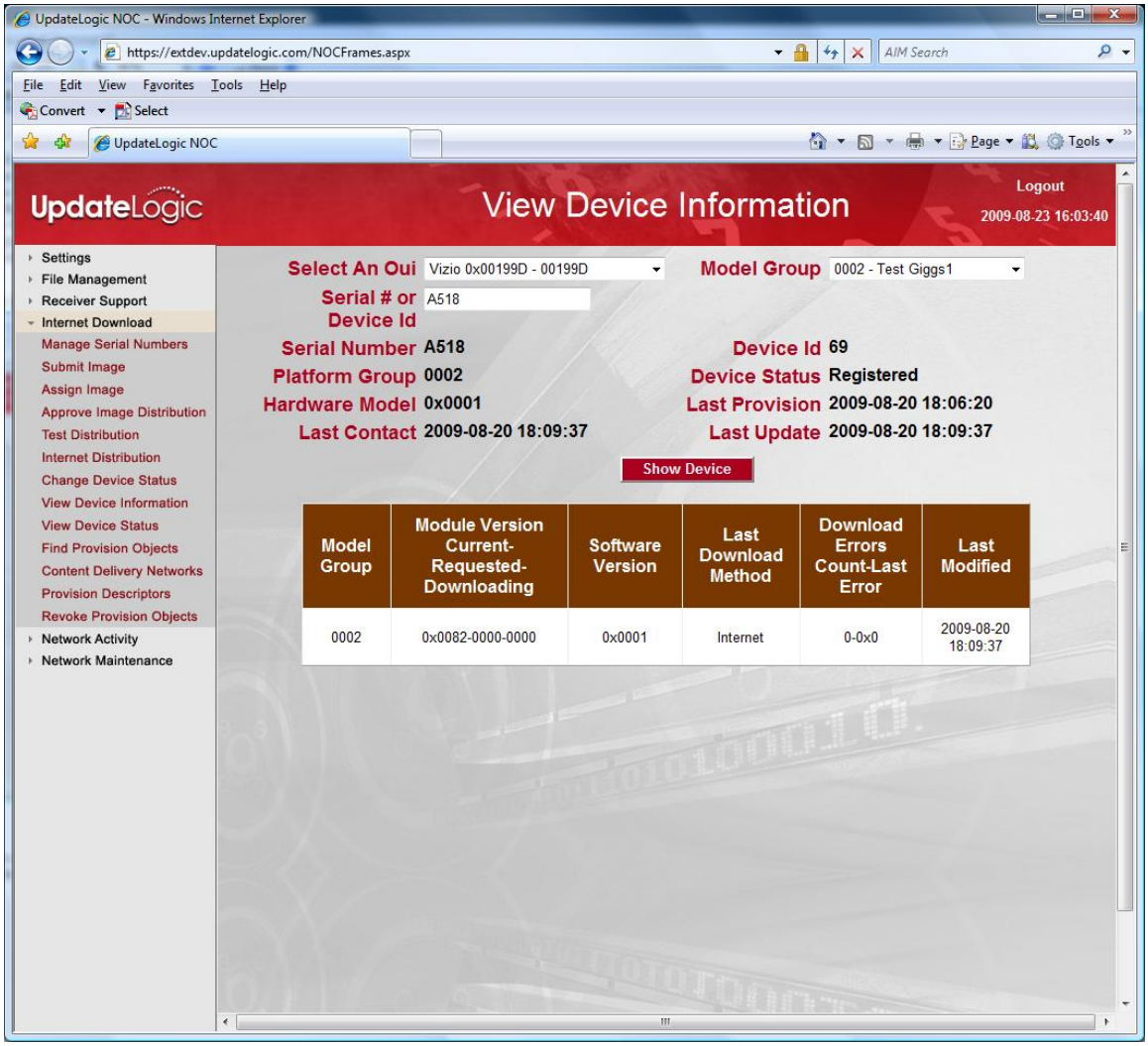


This page allows a given device to be forced to re-register which causes it to re-download all of its security credentials.

4.6 Internet Download->View Device Information

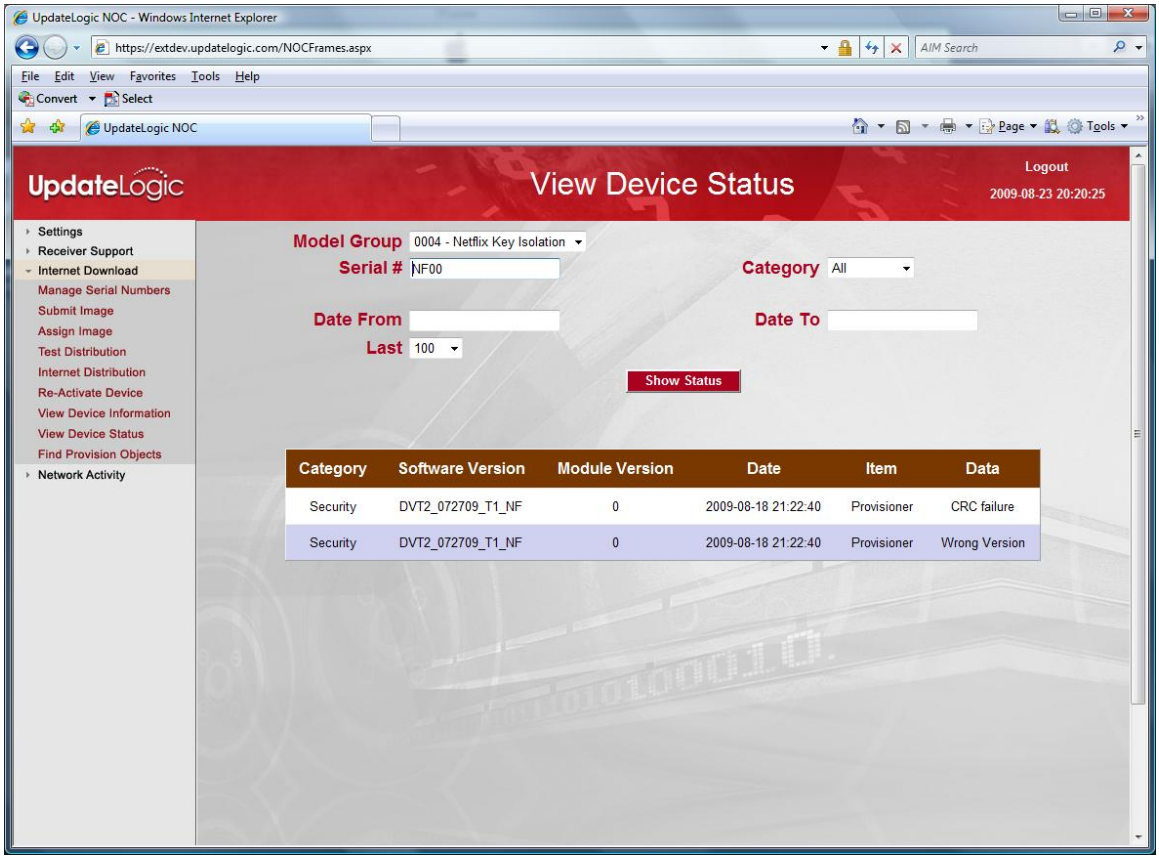


If the specified device has not registered yet, this page will be displayed.



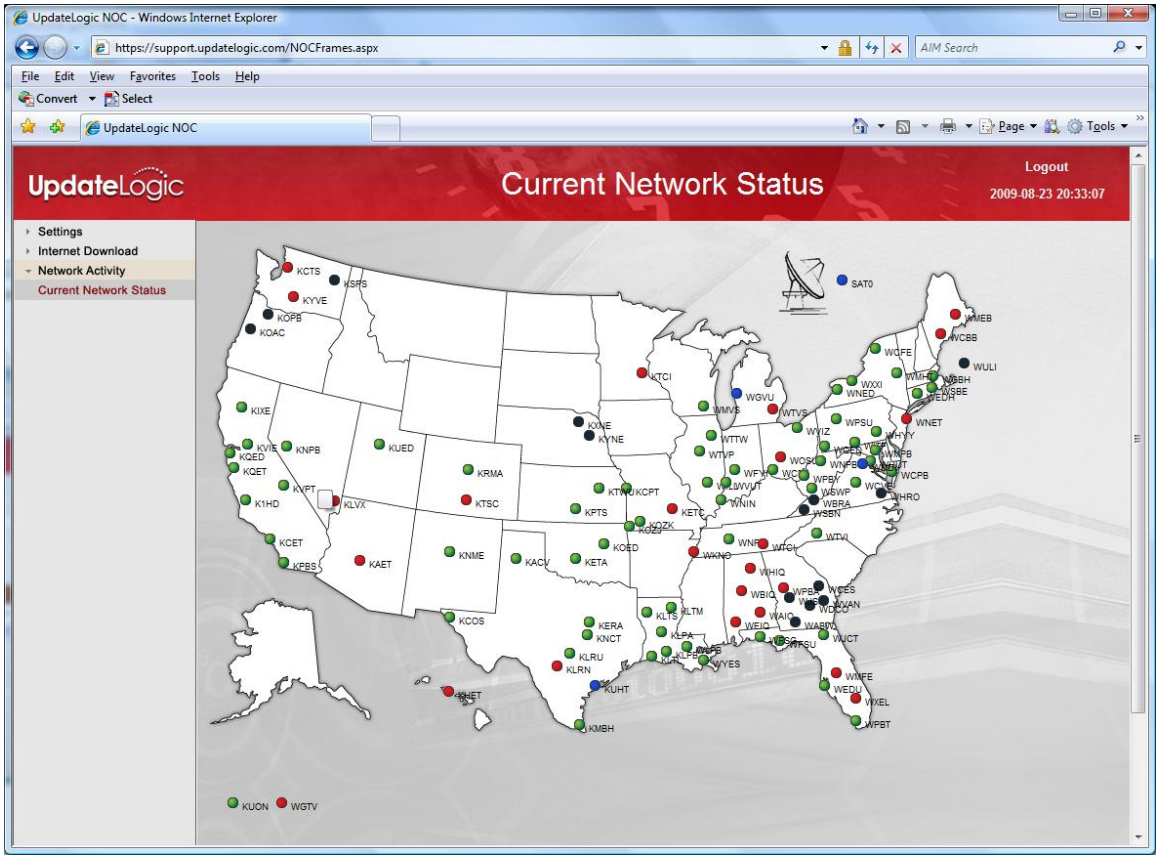
If the specified device has registered, this page will be displayed containing stats about the information about the device.

4.7 Internet Download->View Device Status



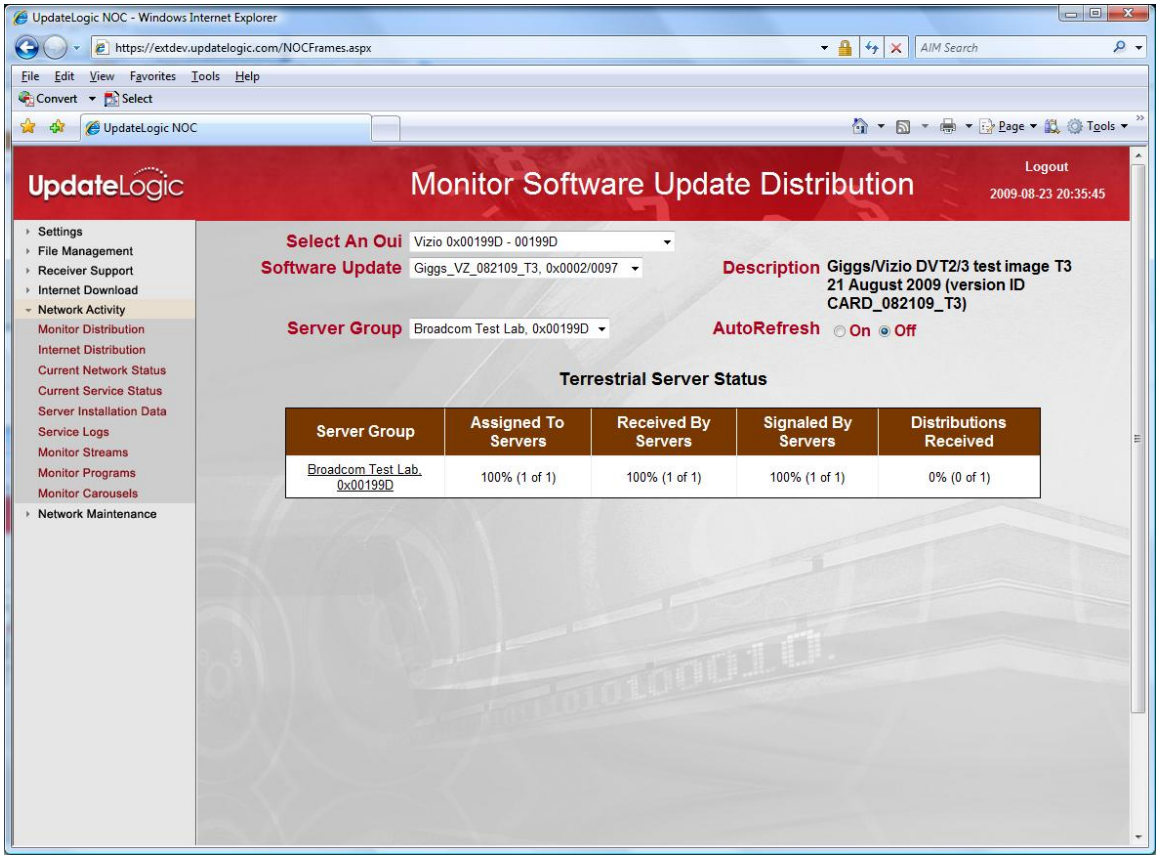
This page displays detailed information about the specified device.

4.8 Network Activity->Current Network Status



This page displays the current nationwide network status. It is the same information displayed in the main menu described in section 4.2.

4.9 Network Activity->Monitor Distribution



This page displays the status of a broadcast update distribution across the servers in the nationwide network.

5 Suggestions for Organizing Technical Support

Generally speaking, there are four tiers of technical support that UpdateLogic recommends. The suggestions below are simplified and not meant to be a detailed blueprint. Most likely the CEM already has a technical support group organized in the manner described. These recommendations are simply meant to stimulate discussion within your organization and with UpdateLogic.

1. Support technicians. This tier initially receives all customer support calls. They work from a rule-based diagnostic script. The script is updated as necessary. In the beginning of a new product rollout, the trouble shooting script will be updated often as new issues are characterized and remedial steps are created in response to them. The script may call for directing the consumer to a streaming media partner to help solve an app-specific problem. Please note, that UpdateLogic does not provide consumer-level technical support. UpdateLogic supports your organization so you can support your customers.
2. Experts. This tier contains empiricists who characterize emerging issue patterns and update the first response trouble shooting script. They are also on call to help trouble shoot one-off difficult issues.

3. Managers. When the experts are unable to solve a problem they should escalate the issue to a manager. The manager is responsible for making a decision on what the next step for resolving the issue should be.
4. Partners. Each TV has different development partners. These may include the chip set manufacturer, the UI framework provider or streaming media providers. Designated contacts at each of these organizations should be available to the CEM's managers in case problems are encountered that the experts need assistance with.

6 Key Diagnostic Questions

This section describes key diagnostic questions that must be answered before trouble shooting any issues that a customer is reporting.

6.1 Is the Internet Connection Working?

At the heart of the connected TV is its Internet connection. In the consumer's home, faster reliable connections result in fast response times, fewer problems, and more agreeable user experience. Slower, poorer connections create frustrating delays in the user experience and can cause timeouts, streaming media glitches, and system behavior that can be difficult for the consumer to characterize which then *affects all connected partner's software*. Before any partner's software including UpdateLogic can be used the TV's Internet connection must be operating reliably. Characterizing this operation includes, but is not limited to, secure wireless authentication, successful IP provisioning via DHCP, general reliability, and speed. The CEM's TV ships with onboard diagnostics that report these parameters. A savvy consumer will read the TVs manual and trouble shoot these basic issues on their own. Less savvy consumers will need help. The integrator can provide guidance to the CEM on how to use the …. menus to diagnose basic Internet connection issues.

6.2 Is the TV Registered With the NOC?

Using caller ID or asking consumer for their phone number attempt to lookup the user's TV SN in the registration database. If the consumer's registration information is not available have them navigate to the "TV Settings->Help" and read the TV's SN to the first responder or read the ESN from the label affixed to the TV. On the NOC navigate to the "Internet Download->View Device Information" page, enter the SN, and press the "Show Device" button. The NOC will respond with one of two pages as described in section 4.6 above. If the TV has not registered, it means that it does not have an Internet connection. The support technician should then prompt the user to check their Internet connection settings. Please contact your integrator for complete instructions on how to troubleshoot the Internet connection. If the TV *has* registered, then the NOC will display the page as shown in section 4.6 above. The key field from a technical support point of view is the "Last Contact" date and time. Please note that the time/dates displayed by the NOC are in Universal Time. The current Universal Time is always displayed in the upper right hand corner of a NOC display page. The "Last Contact" field will allow the support technician to determine whether the TV last made contact a long time ago which may indicate that the consumer's Internet connection has failed or changed in some way since that time.

6.3 Has the TV Been Provisioned?

The NOC will display the last time the device was provisioned on the "View Device Information" page. Knowing that the device has been provisioned is an important step in solving streaming media problems. Without provisioning, the streaming media services will not work.

6.4 Is the TV Running the Latest Software Version?

The NOC will display the currently running version of software on the TV on the "View Device Information" page. It can also be displayed on the TV itself via the TV Settings->Help->System Info screen. All technical support staff should be briefed on the bug fixes contained in each release, the version string associated with the release, and date of its anticipated release on the UpdateTV Network.

7 Coordinating Updates

The technical support organization should remain in close communication with the engineering department of the connected TV that they're supporting. In particular engineering and technical support should work together to schedule updates. A pre-determined update schedule allows a CEM's technical support organization to stay aware of the flow of updates and what the windows are for getting bug fixes into the TVs that they're supporting. Technical support should keep an eye on the cut-off dates to make sure the bugs that they are most concerned about are being addressed by the updates that follow. Likewise technical support should be ready for an additional support load when new updates are enabled.

8 OSD Support For netReady

Every device that netReady is integrated into should give the user access to certain important information via its on screen display. Some of this information should be easily accessible by the user and some may be placed in hidden menus. This section suggests information that is useful to convey to the user and where it might be located.

Main Help Screen

Electronic Serial Number of the device.

Current TV software version string

Hidden Information

ULI software version number.

ULI module version

ULPK Index

Number of provisioned objects

Device Registered flag

Device in Factory Test Mode flag

Device in Field Test Mode flag

ULI Update Version String

Last Provision Status

Last Download Module Version

Last Download Type

Last Download Status

Last Download Time

Last Error

Last Error Time

Error Count