

Converged Services and a New Generation of Networking

... your Comments please! ...

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IPTV

•Standards & interoperability update
•Smart TV, NG-TV, etc.

•Where are they in the **PROCESS**?
•What aspects of the **ARCHITECTURE** and **PROTOCOLS** are **Mature**?
•What are the **GAPs**?

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Outline

- What is IPTV, and Why it is Attractive?
 - Implementation Options
- Current Industry and Standards Activities
 - ATIS IPTV Interop Forum (IIF)
 - OpenIPTVForum
 - MSF
 - ETSI/TIPSAN
 - IETF
- Implementation Challenges
- Emerging SmartTV/NGTV (Google and others)
- Open Discussions, and Q&A

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What's and Why's of IPTV

- IPTV is a set of consumer-friendly video **Services** delivered over a converged IP infrastructure with provisioning for mobility
 - IPTV must provide an equivalent TV experience (QoS/QoE) with the addition of enhanced accessibility & transportability
 - Early implementations have all been **proprietary**
 - Standardized solutions are now being demanded by **Carriers**, Consumer Electronics and the video **Content** owners
- EXPECTATION: Time, Place, and Device Shifting
 - For both Live and On-Demand Contents
- IMS based IPTV can support blended, converged, and personalized services implementation more easily and quickly
 - This allows service providers to adapt **easily** and **quickly** to the customers' requirements, and that can help support sustainable revenue streams

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IPTV Implementation Options

- Classical IPTV
 - For example, *unmanaged* peer-to-peer model
 - Napster, Gnutella, KaZaA, BitTorrent, eDonkey/OverNet
 - Large Number of Servers, Content is Free
 - Access & QoS/QoE are Unpredictable

Network Aware P2P will reduce costs, improve performance

Traditional CDN

P2P

P2P with P4P

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IPTV Implementation Options (.../2)

- NGN IPTV Options
 - IP Multimedia Subsystem (IMS)
 - Web-1/Web-2, Service Oriented Architecture/Network
 - SOA, SDP, SON, Middleware-based Solutions , etc.

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IPTV Implementation Options (.../3)

- Cloud- and Thin-Client based IPTV
 - For example, *managed* peer-to-peer model
 - Hulu, Netflix, Go2Bit, ForceTech, etc.
 - Tracker and Streamer (peer servers), Content may not be Free
 - Access and QoS/QoE may be predictable. Peer-to-Peer Streaming
 - <http://fac.tools.ieff.org/peer-to-peer/ppsp/>
 - <http://fbs.chinamobile.com/venet/ppsp/>
 - IETF Clouds Activities
 - <http://www.ieff.org/mail-archives/webclouds/current/mailist.html>

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IMS IPTV Simplifies Service Blending & Portability

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ATIS IPTV Interop Forum (IIF)

(<http://www.atis.org/iif/index.asp>)

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ATIS IIF Service Phases

(www.atis.org/iif/index.asp)

Phase 3 (Interactive Streaming Services) (2010 and later)

- Interactive TV
- Consumer Originated Video
- Games
- Photos
- IP Party Content Services
- Network-based PVR
- IPv6 Support

Phase 2 (On-Demand Services) (In 2009)

- Video On Demand (Push and Pull)
- Interactive Content
- Downloadable Content
- Mobile Service Delivery
- Parental Control Service
- Notification Services (e.g., Caller ID on TV)
- Advanced Advertising Models
- Targeted, Directory, Advertisement Logging
- Identity Management

Phase 1 (Broadcast TV Services) (Pre-2009)

Establish foundation specifications that define:

- Network Attachment
- Service Provider Attachment
- SI & DRM Entertainment Delivery
- Supported Media Protocols
- Channel Change
- Packet Loss Mitigation Through FEC and Packet Reassembly
- Remote Monitoring
- Emergency Alert Services

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End to End High Level ATIS IIF IPTV Ecosystem

From: IPTV Architecture Requirements (ATIS 0800002)

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End to End ATIS IIF IPTV Architecture

From: IPTV Architecture Requirements (ATIS 0800002)

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Blending IPTV with Other Services (using IMS)

- Presence
- Identity
- Resource Allocation
- Inter-Service Communications e.g. caller ID, widgets
- Single Sign On determined by Profile Server
 - All related services - network used to access
 - Equipment used to access
- Nomadicity and Path management

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Classifying Quality Layers, QoS Parameters and QoE Indicators

From ATIS 0800004

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IPTV Middleware Items

- Emerging Hi Quality Telco provided IPTV/Video needs Next Gen Standards based platform
 - Common standards based API's
 - Single IF for Content providers, local and international
 - Encouragement for MM apps development
 - Facilitates CAS, Metadata and EAS issues
 - Allows for multi-lingual options
 - Future proof - extendable to CEA and revenue producing home networking options

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IIF Standards Issued in 1H2010

- ATIS IPTV Security Soln.: ISS has not focused on specifying a single solution (defined diverse interoperable solutions)
 - ISS has defined standards which provide **common interfaces between servers and client devices**, and has also defined an open **Security Toolkit** based on robust **cryptography** and **certificate-based trust** domains
- ATIS-0800040: IPTV MPEG TRANSPORT STREAM MONITORING (based on SCTE-142, <http://www.scte.org/content/index.cfm?piD=1485>)
- ATIS-0800039: DRM Server-Side Application Programming Interfaces Interoperability Specification
- ATIS-0800035: Technical Report on a Validation Process for IPTV Perceptual Quality Measurements

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IIF Standards Issued in 2H2009

- **Test Plan for Evaluation of Quality Models for IPTV Services (ATIS-0800025)** describes a comprehensive test plan for validating objective perceptual quality models in the context of IPTV services. The plan defines the procedure for evaluating quality models' criteria, performance, evaluation and documentation. Using a single standardized test for various services allows diverse algorithms to be consistently tested and enables easier cross-comparison. This document is intended to benefit Quality of Experience (QoE) model standards development and alternatively available QoE model test processes.
- **Remote Management of Devices in the Consumer Domain for IPTV Services (ATIS-0800009.v002)** expands ATIS-0800009 to include additional details on security considerations and clarifies the software download sequence and protocols.
- **Multicast Network Service Specification (ATIS-0800019)** provides a baseline set of requirements to ensure interoperability between service provider IPTV multicast applications and the network provider domain, the home network, and the IPTV Terminal Function (ITF). It describes an IP multicast service that the network provider can use as a basis for a linear/broadcast TV service.

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IIF Standards Issued in 1H2009

- ATIS-0800013, Media Formats and Protocols for IPTV Services
- ATIS-0800018, IPTV Linear TV Service
- ATIS-0800022, IPTV Consumer Domain Device Configuration Metadata
 - ATIS-0800024, Security Robustness Rules Interoperability Specification (new in 2Q09)
- ATIS-0800028, IPTV Fault Codes for IPTV
- ATIS-0800029, IPTV Terminal Metadata Specification
- ATIS-0800032, Metadata for IPTV Fault Codes (new in 2Q09)

Source: ATIS April-09 Press Release, <http://www.atis.org/PRESS/pressreleases2009/041709.htm>

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IIF Standards Issued in 2008

- ATIS-080009, Remote Management of Devices in the Consumer Domain for IPTV Services
- ATIS-080010, Emergency Alert Provisioning Specification
- ATIS-080011, QoS Metrics for Public Services
- ATIS-080012, IPTV Emergency Alert System Metadata Specification
- ATIS-080014, Secure Download and Messaging Interoperability Specification
- ATIS-080015, Certificate Trust Management Hierarchy Interoperability Specification
- ATIS-080016, Standard PKI Certificate Format Interoperability Specification
- ATIS-080017, Network Attachment and Initialization of Devices and Client Discovery of IPTV Services
- ATIS-080020, IPTV Electronic Program Guide Metadata Specification
- ATIS-080021, EPSNR Trial-Use Standard

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IIF Standards Issued in 2006-2007

- ATIS-0800001, IPTV DRM Interoperability Requirements
- ATIS-0800002, IPTV Architecture Requirements
- ATIS-0800003, IPTV Architecture Roadmap
- ATIS-0800004, A Framework for QoS Metrics and Measurements Supporting IPTV Services
- ATIS-0800005, IPTV Packet Loss Issue Report
- ATIS-0800006, IIF Default Scrambling Algorithm
- ATIS-0800007, IPTV High Level Architecture
- ATIS-0800008, QoS Metrics for Linear Broadcast IPTV

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IIF Hot Topics (DRM, ID Management, etc.)

The diagram illustrates the Identity Management framework. It is divided into three main functional areas:

- Business and Security Applications including Identity-based Services:** This area includes Application Services Access Control (e.g., Multimedia and IPTV), Single Sign-on/Sign-off, Role-based Access to Information, Resources and Assets, Protection of Personally Identifiable Information, and Security Protection of Information and Network Infrastructure.
- IDM Functions and Capabilities:** This area includes Identity Lifecycle Management, Identity Information Correlation and Binding, Identity Information Authentication, Assurance and Assertions, and Discovery and Exchange of Identity Information.
- Entities:** This area is divided into:
 - Identifiers (Info. Used):** Email address, Telephone Number, URI, IP address.
 - Credentials:** E.g., Digital Certificates, Tokens, and Biometrics.
 - Attributes:** E.g., Name, Claims, Classes, Profiles, Locations.
 - Organizations, Service Enterprises, Government Enterprises:** These entities use Identifiers and Credentials.
 - Network and Service Providers:** These entities use Attributes and Credentials.
 - Trust Objects:** These are used by Network and Service Providers.

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Open IPTV Forum

<http://www.openiptvforum.org/>

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Vision of Open IPTV Forum

Personalized and interactive IPTV in a standardized way

via Managed Networks and the Open Internet

The diagram shows a vision of personalized and interactive IPTV. It features a central image of a globe with a hand pointing at it, surrounded by icons for Streaming, Voting, Advertising, and Mobility.

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Goals and Objectives of OpenIPTVForum.Org

→The main Open IPTV Forum objective is to produce open e2e specifications for IPTV including:

- Architecture and interfaces
- Network and terminal functionality
- Interactive and personalized services
- Technology choices for all major functionalities
- A common UNI (User Network Interface) for Open Internet and managed networks
- Certification of equipment including end user devices and service provider offerings

→This e2e specification shall support:

- A variety of IPTV and internet multimedia services
- Managed networks and open Internet
- Integration with communication services
- Convergence of IPTV and multimedia services across different access technologies
- Easy integration of 3rd party content offerings
- Various devices in the home network

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OpenIPTVForum's Standardization Issues

- Fragmented World of Standards
- No end-to-end perspective
- Proprietary solutions
- Limited interoperability and economics of scale

Issues addressed by Open IPTV Forum

The diagram shows a vertical stack of standardization issues. From top to bottom: DVB IPTV, ATIS, OMC OASIS 4, IPTV, 3GPP, Transport, and UPnP. A vertical double-headed arrow labeled 'e2e' spans the entire stack, indicating the end-to-end perspective.

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Scope of OpenIPTVForum's Works

* This diagram also assumes Multiple Managed Networks and multiple Service Platform Providers via Open Internet

The diagram illustrates the scope of work, showing the interaction between an Open IPTV common UNI, Managed Networks, and Open Internet. It details the roles of Access Providers, Service Platform Providers, and IPTV Providers, along with various interfaces like TCI, SIP, and CP.

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OpenIPTVForum's High-Level Architecture

The diagram shows a complex high-level architecture with multiple layers and components, including UNI, Managed Networks, and Open Internet, all interconnected to support IPTV services.

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... a report from a real-life
Implementation & Interoperability event (GMI08) ...
World's FIRST IMS-IPTV Interop

Source: http://www.msforum.org/interoperability02-MGS81044-MFS_Whitepaper.pdf

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IMS-Based IPTV Interop. during GMI08

- Covers a variety (linear/broadcast TV, VoD/CoD, and nPVR) of IMS base IPTV testing and Interop scenarios
- IMS based IPTV test demonstrates the following
 - session initiation and bandwidth reservation capabilities of IMS
 - program guide and service control capability by "SSF and App-Server" (modules within IPTV Apps Server)
 - high quality video transmission capability between IMS-IPTV-UE and MDF (a part of VMS) or head ends

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IMS-Based IPTV Interop. during GMI08 (.../2)

- The test scenario includes both M1 and M2 variants (i.e. the mechanism by which the RTSP channel and the associated media channel is negotiated)
- ATIS IIF-based IPTV conformance tests that focused on key IIF standards covering authentication and initialization of IPTV Terminal Function (ITF) and validation of QoS metrics as outlined in ATIS specifications
- All of these tests were Conducted at the Verizon (Waltham, MA) site

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IMS-Based IPTV Service Implementation and Interop. during GMI08

Figure 7 The test for this test scenario are shown to users.

Source: http://www.msforum.org/interoperability02-MGS81044-MFS_Whitepaper.pdf

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MSF Services Whitepapers (SA WG)

Services Work Area (SWA)	High-Level Description	Context
SWA-1	Blended/Converged IPTV Services (MM Services Anytime and Anywhere to Any Device)	IMS
SWA-2	Priority and Emergency Services (Emergency Alerts, GETS, SCIP, etc.)	All
SWA-3	CoS over NG-CI (voice and MM services)	Any
SWA-4	Personalized Converged Services (e.g., Caller ID on TV)	IMS
SWA-5	Multimedia Services Continuity (EvoD, Mobile voice/Data/Video Convergence)	Any
SWA-6	Location- and Presence-Based Services (Targeted Ads, Session Requests, etc.)	All

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Highlights of IPTV Arch. Enhancement

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ETSI/TISPAN

http://www.etsi.org/plugtests/IMS3_IPTV1/IMS_IPTV.htm

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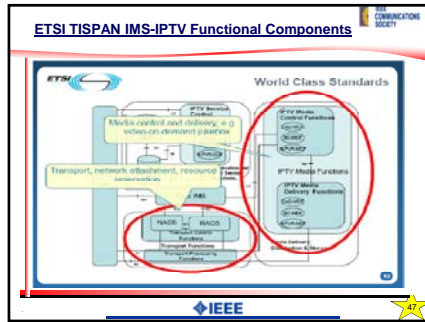
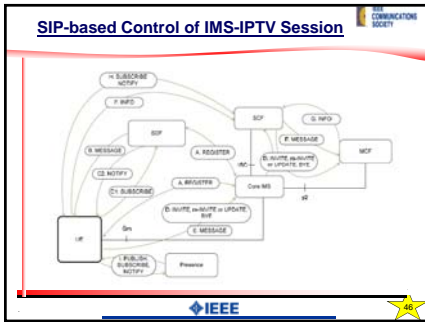
ETSI TISPAN IMS-IPTV Architecture

Figure 21 Functional architecture for IPTV services

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ETSI TISPAN IMS-IPTV Functional Components

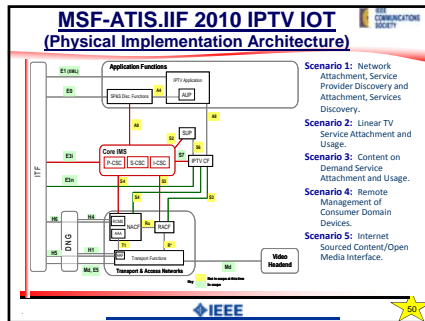
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ETSI/TISPAN IMS IPTV Plugtest

http://www.etsi.org/plugtests/IMS3_IPTV1/IMS_IPTV.htm

- ### MSF-ATIS.IIF 2010 IPTV IOT (Nov.-2010 (I) or March-2011)
- Scenario 1: Network Attachment, Service Provider Discovery and Attachment, Services Discovery**
 - Scenario 1a: DNS Attachment
 - Scenario 1b: I/F Attachment
 - Scenario 1c: Non-IMS Service Provider Discovery and Attachment
 - Scenario 1d: IMS-based Service Provider Discovery and Attachment
 - Scenario 1e: Services Discovery and Selection
 - Scenario 2: Linear TV Service Attachment and Usage**
 - Scenario 2a: IMS-based Linear TV Service
 - Scenario 2b: Non-IMS Linear TV Service
 - Scenario 3: Content on Demand Service Attachment and Usage**
 - Scenario 4: Remote Management of Consumer Domain Devices.**
 - Scenario 4a: Software Download Management
 - Scenario 4b: Remote Device Management
 - Scenario 4c: Remote Device Monitoring
 - Scenario 4d: IPTV Monitoring and Testing
 - Scenario 5: Internet Sourced Content/Open Media Interface**



- ### MSF-ATIS.IIF 2011 CDN IOT
- Still Being Defined**
 - May include secure ingestion of content from any party (Internet, Consumer, Third-party) and the distribution to any device (mobile, nomadic, fixed) anywhere
 - Both wired and wireless access may be supported
 - Dynamic transcoding and security management may also be included

- ### IPTV Cost Management Initiatives
- Areas of concern are
 - IPTV Architecture and Network/Service Elements
 - Use cases and test cases
 - Tracing, Diagnosis, Billing and Charging
 - Security and QoE Maintenance
 - <http://www.tforum.org/DrivingtheCostsOut/8482/home.html?linkid=41506&docid=12809>

SmartTV, NG-TV, etc.

Product	Price	Browsing	Flash	YouTube	Netflix	Hulu	1080p	Wi-Fi	DVR
Apple TV	Varies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	TBD
Apple TV	\$229	No	No	Yes	No	No	No	802.11n	No
Boxee Box	\$119.99	Yes	Yes	Yes	TBD	Yes	Yes	802.11n	No
Roku HD X1r	\$129.99	No	No	No	Yes	No	No	802.11n	No
TVo Premiere	\$299.99	No	Yes	Yes	Yes	No	Yes	Optional	Yes
Microsoft Xbox 360	\$199.99	No	No	No	Yes	No	Yes	Optional	No
Nintendo Wii	\$199.99	Yes	Yes	Yes	Yes	No	No	802.11b/g	No
Sony PSS	\$299.99	Yes	No	Yes	No	Yes	Yes	802.11b/g	No

Source: http://www.pcmag.com/article0,0_2817_2349366_00.asp

SmartTV, NG-TV, etc.

<http://www.google.com/tv/>

<http://www.enadget.com/2010/05/21/google-tv-everything-you-ever-wanted-to-know/>

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GoogleTV

- An open platform for multimedia interaction (www.google.com/tv/developer)
- Uses Google **Android** operating system v.2.1 to support TV content and Web applications through Google **Chrome** v.5.0 browser and remote control on Web-connected TV and Blu-ray players
 - Need Broadband Internet access and high-resolution displays
 - Contents must be provided through a sustainable business model
- Blends Web search with the channel surfing experience
 - With a special remote control keypad, users can access a drag-down search box to change channel
 - IM, Twitter, MySpace, FaceBook, etc. comments can be displayed in the same screen (e.g., at bottom right corner of the screen)

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GoogleTV (... /2)


- Social networking and other popular (Android operating system based) Apps will be key drivers for Google TV
- **Sony** is building the Internet TVs and Blu-ray players, and **Logitech** is making set-top boxes and remote controls (for surf channels and browse applications)
 - Both Sony and Logitech are using **Intel** Atom chipsets
 - Google is upgrading (for release in late 2010 or early 2011) its Android NDK/SDK (network/software development kit) to accommodate applications tailored for Google TV
- **CAUTION:** Google will know not only what you do on-line (on-the-Net), but also what you do off-line (that is what you watch!)

<http://www.google.com/tv/faq>

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A Few Useful Books



[1] Chapter 2 & Appendix C of "Implementing Voice over IP" by Bhupip Khasnabish, Published by Wiley-IEEE, 2003, ISBN 0471216666, 9780471216667, 258 pages.

[2] Chapter 3, 4, and 6 of "Multimedia Communications Networks: Technologies and Services" Edited by Mallikarjun Tatipamula, and Bhupip Khasnabish, Artech House, 1998, ISBN 0890069360, 9780890069363, 631 pages.

[3] Chapter 4 of "Next Generation Telecommunications Networks, Services, and Management," Edited by T. Plevyakov and V. Sahin, Wiley-IEEE, April 2010, ISBN: 978-0-470-57528-4, 297 pages.

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Thanks for Your Attention and Participation!



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