ITU-T IPTV-GSI

Workshop on Harmonization of Web and IPTV Technologies

(Rio de Janeiro, Brazil)

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Overview of ITU-T H.721 Recommendation for IPTV Terminal Device

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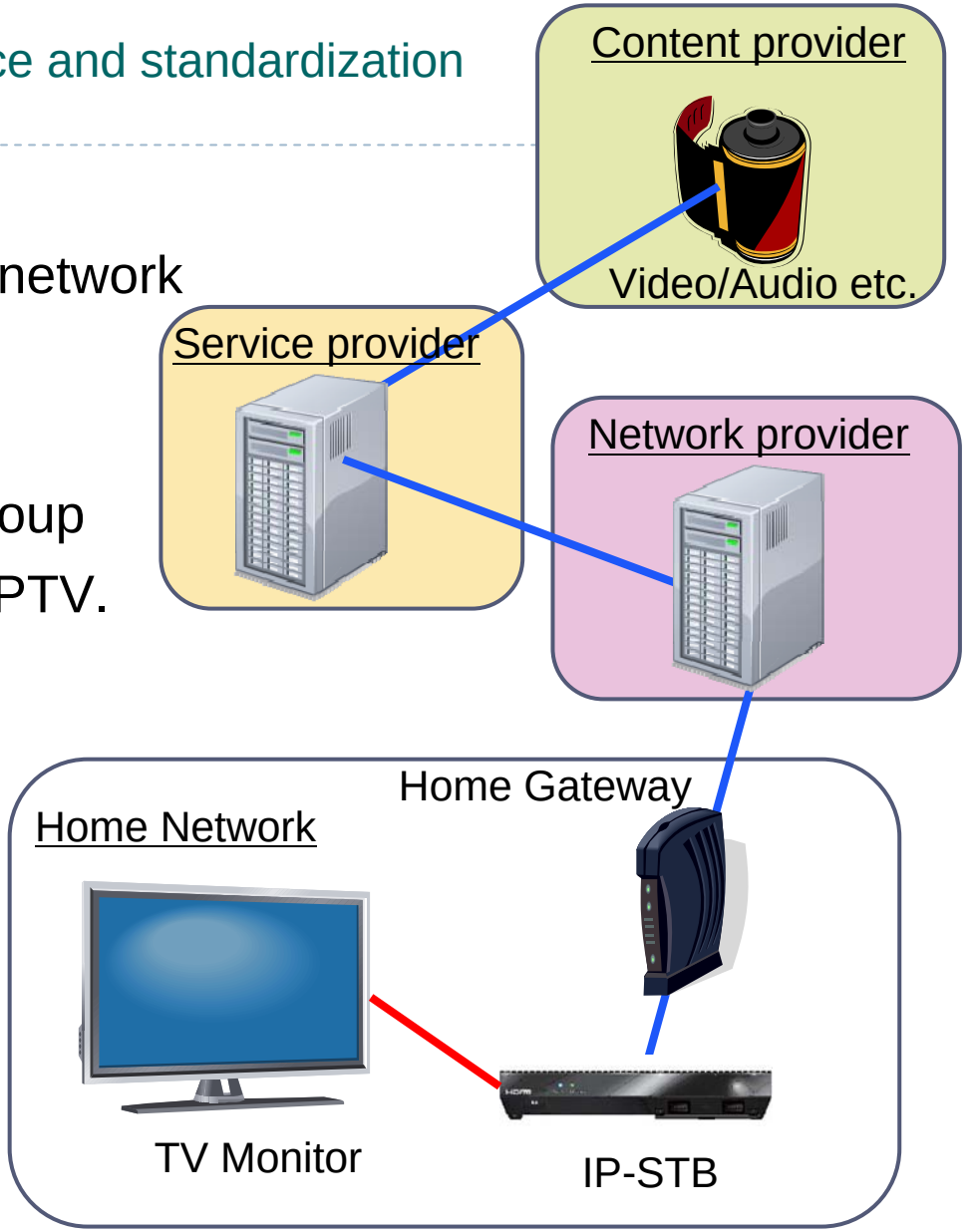
1. Trends in Standardization Activities for IPTV

Spreading of broadband IP video service and standardization (From FG-IPTV to IPTV-GSI)

- IP video services on Broadband IP network has been widespread.
- In 2006 ITU launched the Focus Group to promote the standardization for IPTV.
- In 2008 inherited to IPTV-GSI.
- Since 2010 ITU-T has started the conformance and interoperability test event for ITU-T H.700 series standard compliant IPTV products in the world (Interop Event).



1. Trends in Standardization Activities for IPTV

ITU Interop Event on IPTV

- Conformity and Interoperability testing of ITU-T H.700 series compliant products

- Target recommendations

(1)H.701 (Error Recovery)

(2)H.721 (IPTV Terminal Device)

(3)H.740 (Event Handling and Audience Measurement)

(4)H.750 (Metadata)

(5)H.761 (NCL Ginga)

(6)H.762 (LIME)

(7)H.770 (Service Discovery)

- H.721 was tested in IOT events
  - 1st IOT (Jul. 2010@Geneve), 2nd IOT (Sep. 2010@Singapore),
  - 3rd IOT (Dec. 2010@Pune), 4th IOT (Jul. 2011@Rio de Janeiro)

The 1st Interop Event

- From July 20th to 23rd 2010 in Geneva (ITU HQ)

Participants: Cisco, Mitsubishi, NEC, NTT, OKI, PUC-Rio and Sumitomo

- Press Release: www.itu.int/ITU-T/newslog/CategoryView,category,IPTV.aspx
- Photos: www.flickr.com/photos/itupictures/
- Videos: www.youtube.com/watch?v=CpJmI_5aQrA

The 1st Interop Event

- From July 20th to 23rd 2010 in Geneva (ITU HQ)

Key speech by Dr Hamadoun Touré, Secretary General, ITU

A view of conformance test

Many Telco Carriers, Medias including ITU secretary general visited the showcase

A scene of Briefing for IOT

Certification issued for participants

The 2nd Interop Event

- From September 23rd to 27th 2010 in Singapore (Fusionopolice)

  Participants: Cisco, Mitsubishi, NEC, NTT, OKI, PUC-Rio, Sumitomo, TVStorm, V One Multimedia

Video: http://www.itu.int/net/ITU-T/cdb/interop.aspx
http://www.youtube.com/watch?v=oRRve8sJKTY

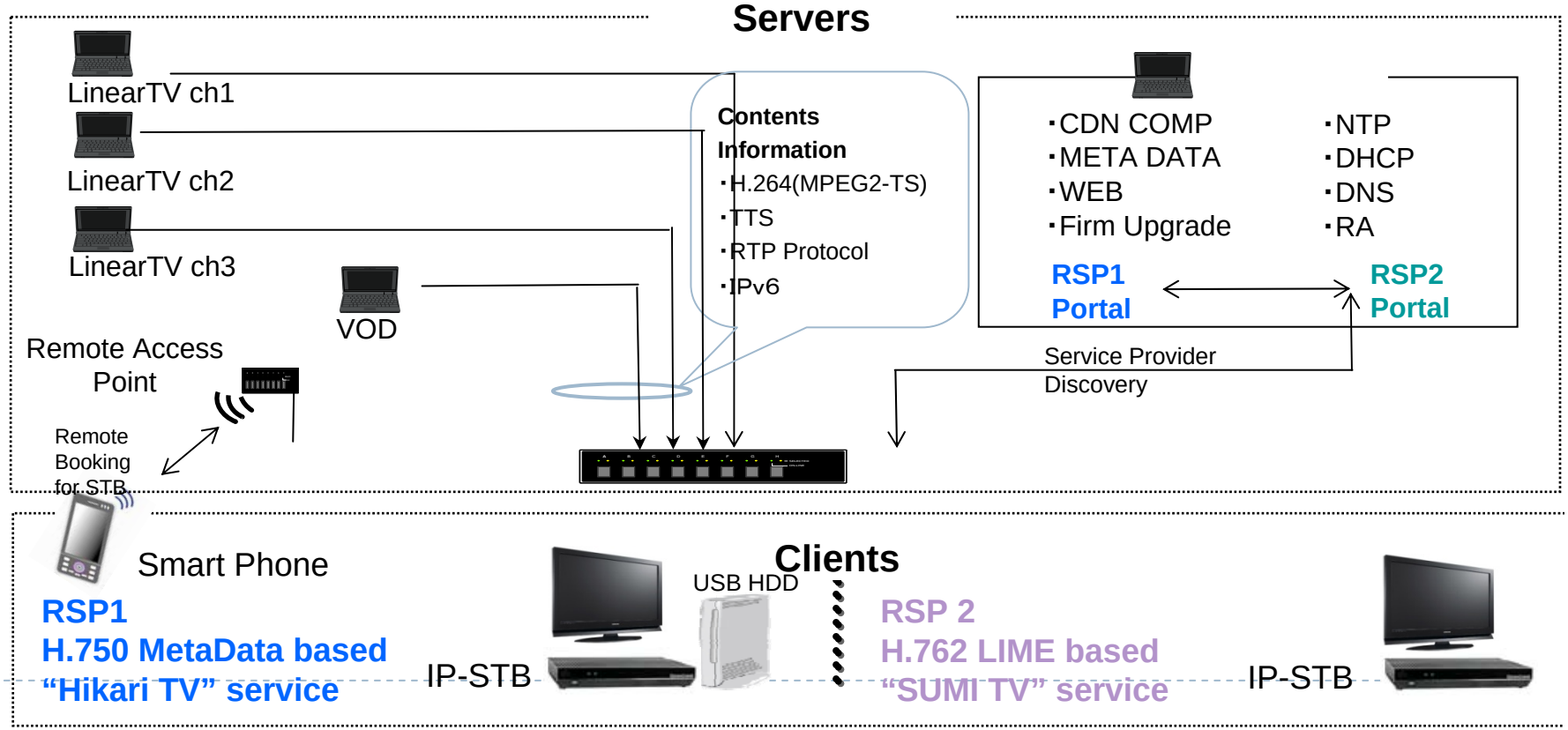
The 3rd Interop Event and Showcase

- Dec14th - 17th 2010 in Pune (Sinhgad Polytechnic)

New Participants： Tech Mahindra

- System configuration of the Showcase

H.770 Operator and Service Discovery
H.721 IPTV Basic Terminal Device
H.750 TV Anytime Metadata
H.762 LIME Middleware



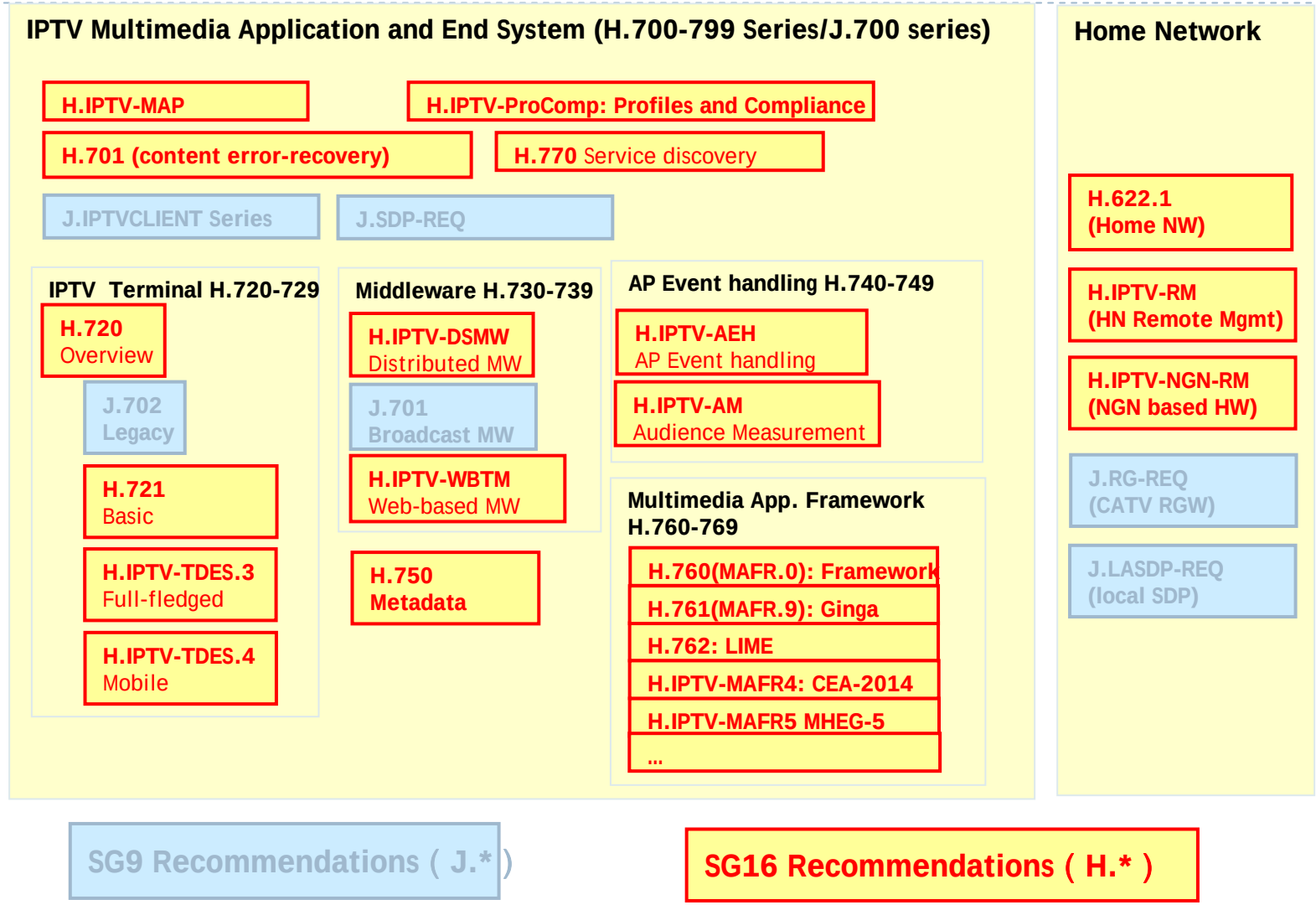
The 4th Interop Event and Showcase

- From July 18th to 22th 2011 in Rio de Janeiro

  IOT Participants: OKI, PUC-Rio, Sumitomo, TOTVS
  ShowCase Participants: Mitsubishi, OKI, PUC-Rio, Sumitomo, TOTVS, ZTE

- New Test Case : H.761 (Ginga NCL) and H.762 (LIME)

2. ITU-T Recommendations for End System



3. Over view of H.72X series recommendations for IPTV TD

Consented

H.720 “Overview of IPTV terminal devices and end systems”

H.721 “IPTV terminal devices : Basic model

Under Study

H.IPTV-TDES.3 “IPTV Terminal Device : Full-fledged model”

H.IPTV-TDES.4 “IPTV terminal device : Mobile model”

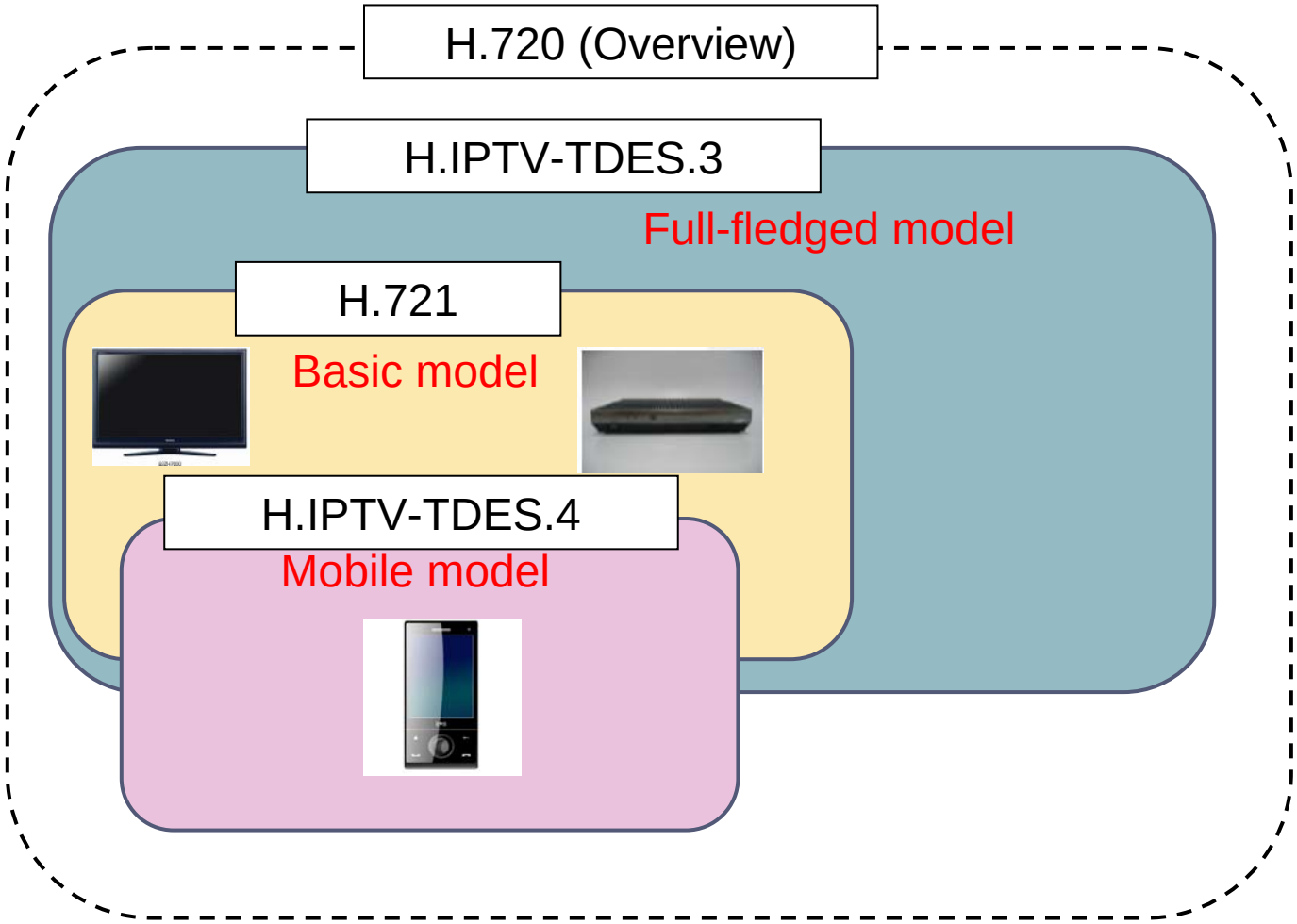
3. Over view of H.72X series recommendations for IPTV TD

- Services for each terminal device model

Terminal device model	Service
Basic model (H.721)	**“Basic Services”** Linear TV, Video on demand (VOD), Portal Service, etc.
Full-fledged model (TDES.3)	**”Basic Services”＋“Advanced Services”** Push VOD, Video Phone, Advertisement, PVR, Audience measurement, Personal Broadcasting, etc.
Mobile model (TDES.4)	**“Basic Services” + Mobile oriented Services“** Linear TV & VOD for mobile, Interactive Services, advertisement based on user location

3. Over view of H.72X series recommendations for IPTV TD

- Scope and relationship of each H.72X recommendation



4. Target services and Scopes of H.721 Recommendation

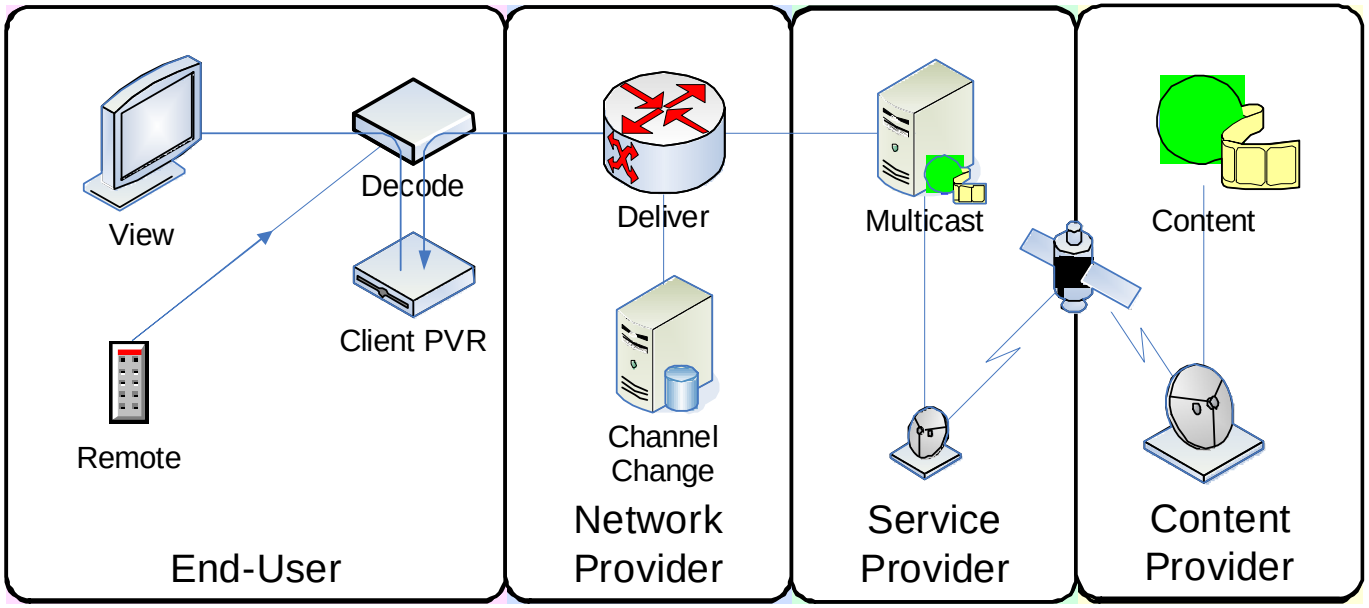
- Linear TV and VoD services
- Services on managed network
- Targeted both for STB of service operator and IPTV embedded TV sets in the retail market
- Service navigation functions
  - *Remote Controller, EPG, Portal etc.*

- Interactive services
- Public interest services
  - *Emergency Broadcast, Subtitle, Sign language, and so on*

5. Details of H.721

(1) Linear TV service

- Multicast delivery
- Programs on temporal order
- Include IP retransmission of Terrestrial and Satellite Broadcasting



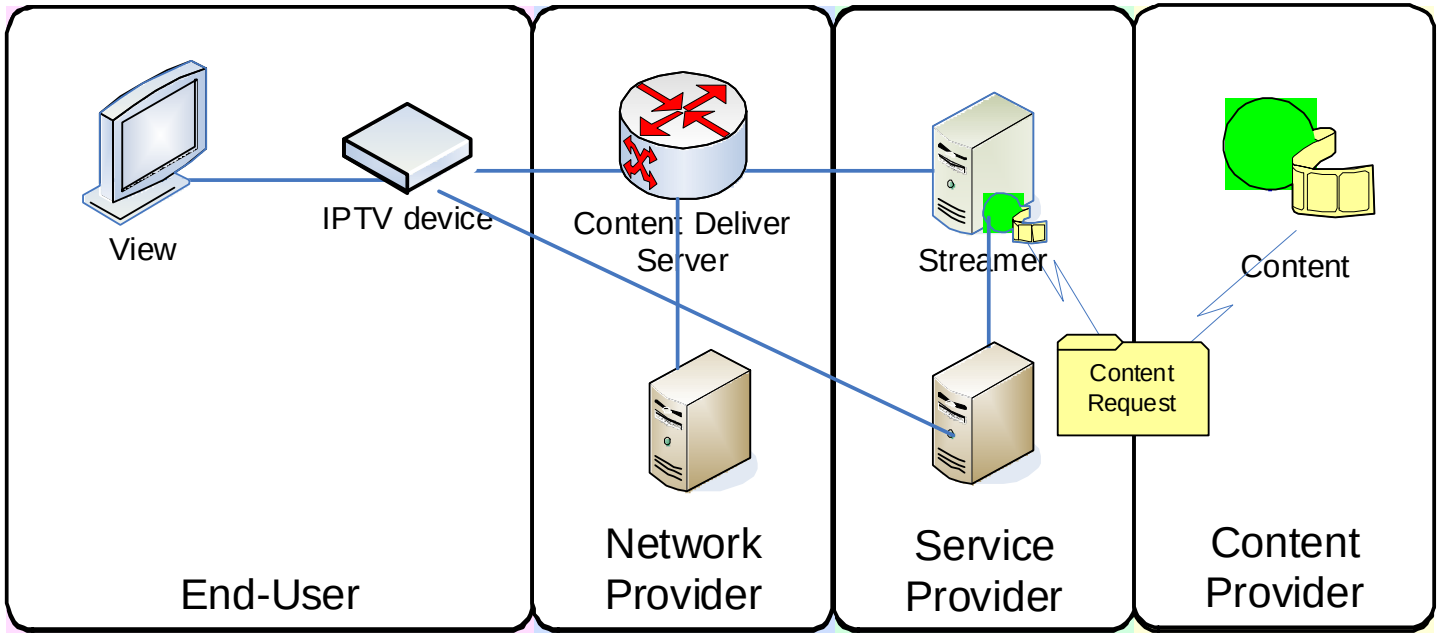
Linear TV with Client PVR

5. Details of H.721

(2) Video on-demand Service

- Unicast delivery
- Contents is served by end-user's choice
- Support trick-plays

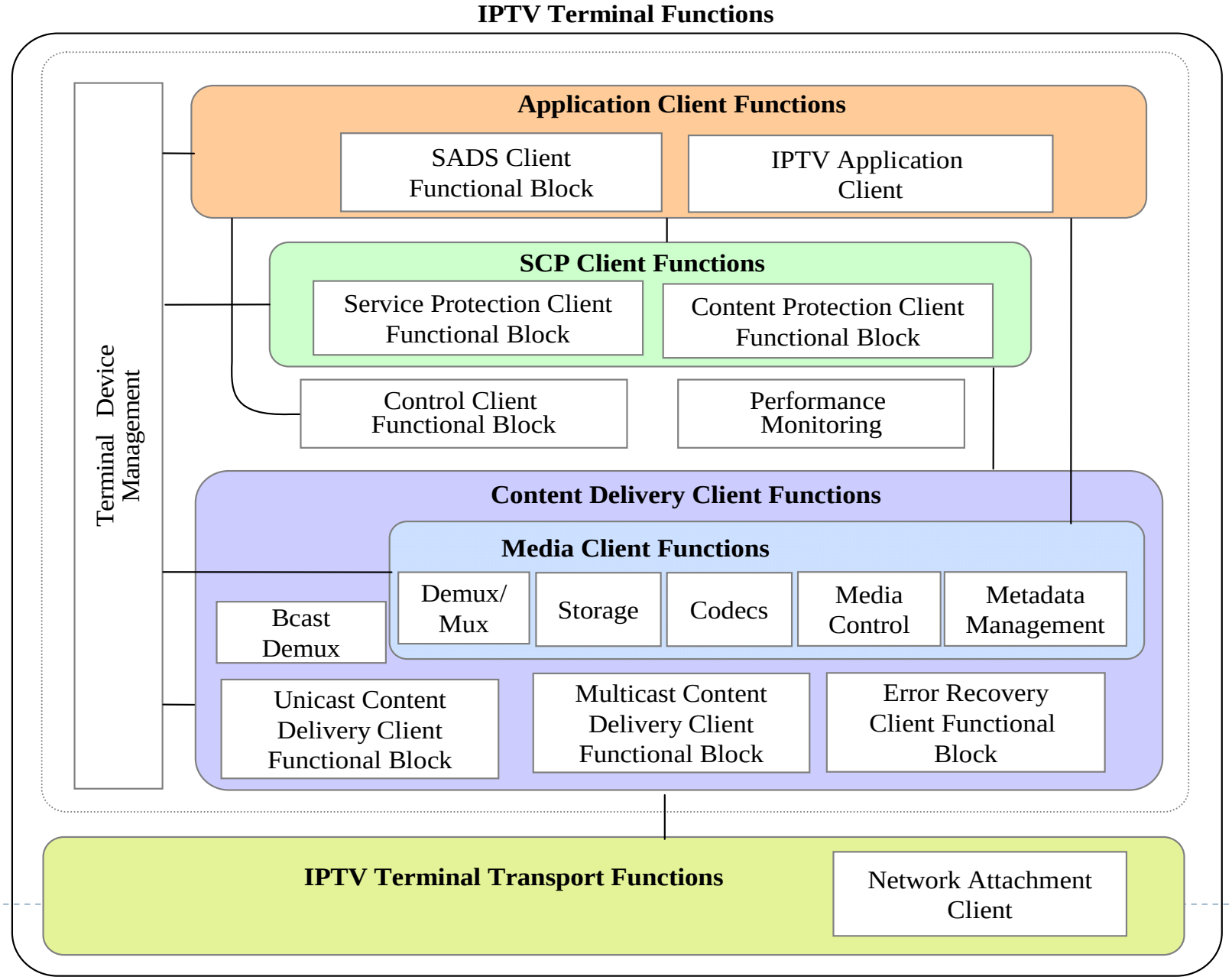
  - Valiable playback speed control, fast-forward play, rewind, pause, etc.



On Demand services

5. Details of H.721

(3) Functional components of H.721 terminal device



Terminal Transport Functions

- Network communication Interface
- Communication processing

  - RTP, UDP, HTTP/TLS, TCP, IP, IGMP/MLD
- Network attachment processing

  - DHCP, DNS

Content Delivery Client Functions

- Multicast content delivery client function block
  - *IGMPv2, MLDv2*
- Unicast content delivery client functional block
  - *RTP and RTSP*
  - *HTTP for VoD contents selection*
- Error recovery client functional block
  - *FEC based error recovery (H.701)*

Media Client Functions

- Playback and trick mode functionalities for VoD
  - *Playback, Fast-Forward, Rewind, Pause, Stop, Chapter, etc.*
- Demux/mux functional block
  - *MPEG2 TS/TTS, clock synchronization*
- Codec functional block (Decoding)
  - *Video :MPEG2 (ITU-T H.262), MPEG4/AVC(ITU-T H.264)*
  - *Audio :MPEG-2AAC, MPEG-1 L2, MPEG-4 HE-AAC, AC-3*
- Storage functional block
  - *Storing ID of services, password, License key*
- Metadata management
  - *Caching, Searching, Parental control*

SCP Client Functions

SCP=Service and Content Protection

- Service protection client functions
  - *- Secure communication channel*
  - *- Authentication with SCP server*
  - *- CRL update and management*
- Content protection client functions
  - *- Content key acquisition*
  - *- Extraction of the descrambling key from ECM*

IPTV Application Client Functions

- IPTV Application Client Functions
  - *- Handling HTML/BML,*
  - *- metadata to replay control*
  - *- EPG/ECG*
- SADS client functions
  - *- Service provider discovery*
  - *- Service discovery*
  - *- Service selection*
  - *(compliant with H.770)*

Other functions

- Control client functions
  - *RACF resource management*
- Terminal device management
  - *Remote management*
- Physical Interface
  - *Rest botton, Remote controlle*
  - *RGB, DVI, Digital Audio, HDMI*

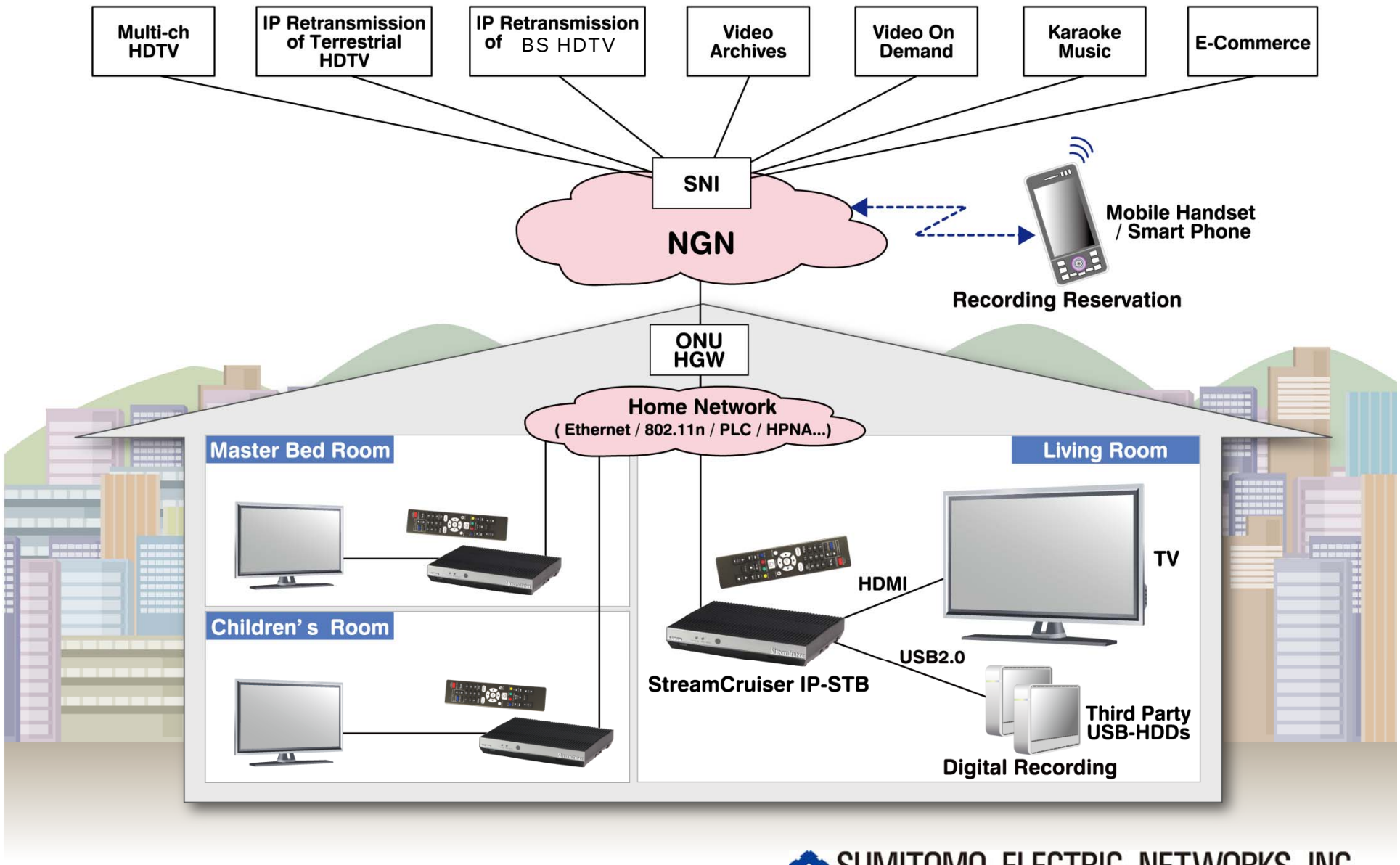
6. Conformance testing specification for H.721

- HSTP.CONF-H721

- *New draft recommendation was created in Shanghai meeting in March 2010.*
- *Approved in SG16 meeting in July 2010.*
- *Added some new test items in later meetings.*

7. Example for Commercial IPTV Deployment of H.721

Example of IPTV Commercial Service in Japan



7. Example for Commercial Deployment of H.721

ITU-T H.721 Compliant Commercial IP-STB in Japan (Sumitomo *StreamCruiser* IP-STB for NTT Groups Hikari TV service)

- **Service and Provider Discovery (ITU-T H.770)**
- **Supports multiple UI Middlewares**
  - **TVAnytime MetaData (ITU-T H.750) compliant high speed resident applications**
  - **LIME (ITU-T H.762) and HTML5-subset compliant browser based middleware realized the contents creation by service operator**
- **Supreme QoS with using Application Layer FEC (ITU-T H.701)**
- **IP Re-transmission of Digital Terrestrial TV and 1080i Full HD (H.721, H.264)**
- **Contents Protection with using IPTV Forum standard DRM (Marlin)**
- **Supports NGN (New Generation Network) and IPv6 Multicast MLDv2**
- **Service expansion provided by reliable Firmware Update Server : STManager**

7. Example for Commercial Deployment of H.721

An example for the penetration of IPTV service by standardization in Japan

- 1st-Gen. IPTV : Custom specification per servicer, expensive TCO & the lack of retransmission of major Terrestrial TV contents **prevented the penetration of IPTV**

Group		NTT			KDDI	Softbank
Servicer		**NTT-COM/OCN-Theater**	**Plala/4thMEDIA**	**OnDemand TV**	Hikari Plus TV	BBTV
Network		IPv6 FTTH			IPv4 FTTH/DSL	
Codec		MPEG2TS	MPEG2PS 6Mbps	MPEG2	MPEG2	MPEG2
Service	Multicast TV	61ch	61ch	35ch	30ch	43ch
	VOD	6,000 titles	12,000 titles	5,000 titles	5,000 titles	5,000 titles
	Karaoke	○	○	○	○	○
	Game	○		○		○

- 2nd-Gen. IPTV : In Mar 2008, NTT-Plala's "Hikari-TV" has started its commercial service, which compliant with the IPTV Forum Japan Standard that is a proactive deployment of ITU-T H.721

Service	**(1) IP re-transmission of Terrestrial Digital TV, (2) Multicast TV, (3) VOD, (4) Karaoke, (5) Archives On Demand, (6) USB-HDD Digital Recording**
IP-STB	**ITU-T H.264, H.701, H.721, H.750, H.762, H.770… Compliant**
Network	**NGN or FTTH Service**
Codec	**H.264(AVC) / MPEG2, TS/TTS, 10Mbps to 14Mbps(HD), 4 to 6Mbps(SD)**
DRM	**Marlin**

The number of the subscriber of the standard compliant IPTV service "Hikari TV" exceeds 1M within 2 yeas

8. Conclusion

- H.721 specifies the functions to be supported by IPTV terminal devices that are operated on the managed network.
- The main target devices are IP-STB and TV set embedded with IPTV function.
- Included services are Linear-TV, VoD, Service navigation and public internet services.
- Conformance testing specifications（HSTP.CONF-H721） was approved and tested in ITU-T Interop events.
- Multiple of H.721 compliant terminal devices has been already implemented and deployed.

Thank you

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