APT/ITU Conformance and Interoperability Event
09 – 10 September 2013, Bangkok, Thailand

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OKI Electric Industry Ltd.

REPORT OF IPTV TESTING AND SHOWCASING

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APT/ITU Conformance and Interoperability Event

09 – 10 September 2013, Bangkok, Thailand

Source : OKI, Japan

Report of IPTV Testing & Showcasing

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IPTV Testing & Showcasing General

- Purpose
  - Testing
    - Confirm interoperability on H.721(IPTV basic terminal), and H.762(LIME) between server (OKI) and STB (Mitsubishi Electric)
  - Showcasing
    - Demonstrate streaming from ITU IPTV IPv6 Global testbed in Japan to Thailand
    - Demonstrate interactive applications between server and STB/tablet.
    - Demonstrate IPTV application programs in ITU Application challenge (NTT, Chulalongkorn Univ.)
- Participating Organizations
  - OKI Electric, Mitsubishi Electric, (NTT, Chulalongkorn Univ.)

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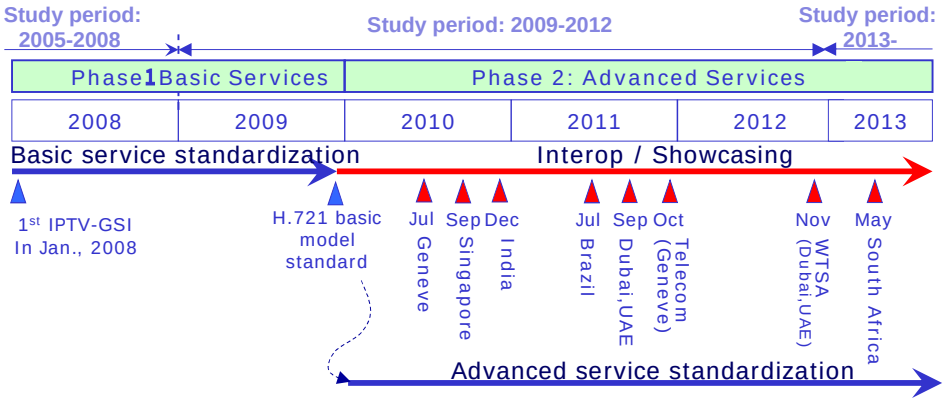
IPTV defined in ITU IPTV standards

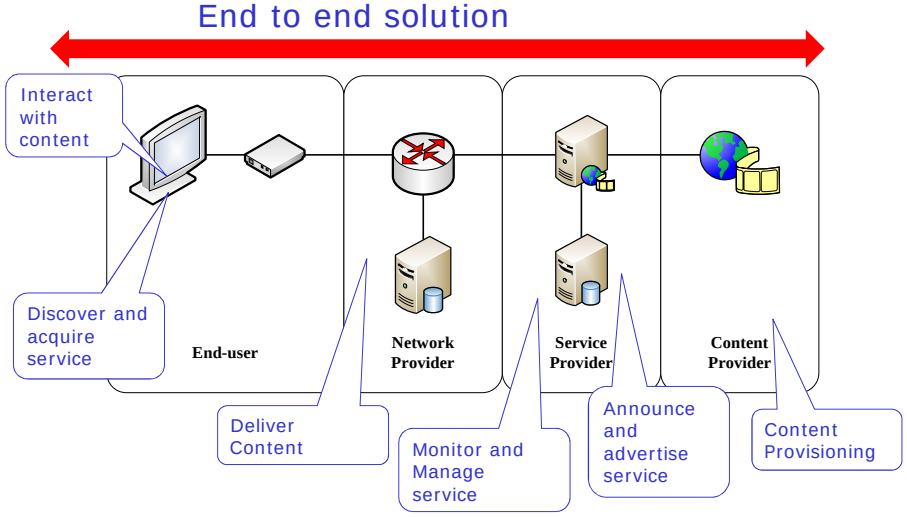
- IPTV\ = Internet Video
- Defined as "*multimedia services, such as Television; Video; Audio; Text; Graphics; Data, delivered over IP based networks managed to provide the required level of QoS/QoE, security, interactivity and reliability*".



IPTV value chain

ITU-T IPTV supports IPTV value chain

End to end solution

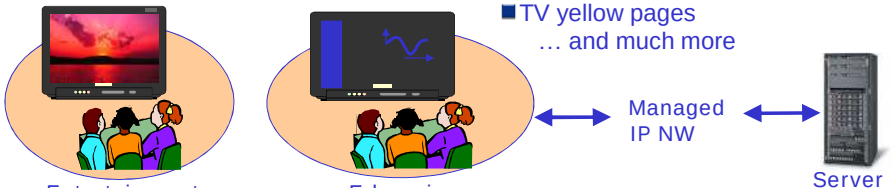


IPTV Services overall

- IPTV is a killer service of broadband infrastructure.
- By using of IP, IPTV provides interactive TV services.
- IPTV can be used as a platform of lots of TV base services.

- Basic entertainment services
  - Linear (Channel Service) Broadcast TV
  - Video On Demand (VoD)
  - Accessibility: captioning, descriptive audio
  - Audio services
  - Karaoke, gaming
- Public Services
  - Billboards, disaster alerts, traffic news, etc
- E-*
  - E-government
  - E-publishing (e-Books, Newspaper)
  - E-commerce (banking, etc.)
  - E-learning (distance learning)
  - E-health (telemedicine, tele-healthcare)
- Private and Community Broadcasting (sharing videos)
- Photo albums (sharing photos with your friends)
- TV yellow pages

… and much more



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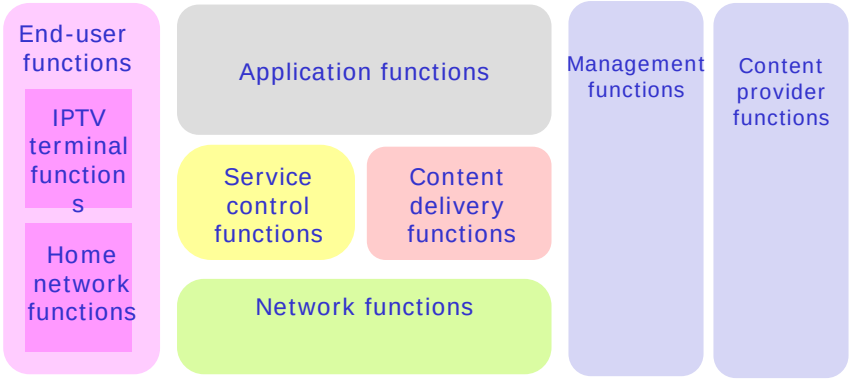
ITU-T IPTV functional architecture framework

- IPTV functional architecture identifies the principal functional groups for IPTV.
- For the time being, End-user functions and Application functions are hot topics in IPTV-GSI



[ITU-T Y.1910]

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Overview of ITU-T Recommendations for IPTV

- End-user functions and Application functions are hot topics now.
- There are lots of draft Recommendations and Technical papars under discussion

Home networking

- H.622.1: Req & Arch for IPTV Home networks

Applications and end-systems

- H.750: Metadata for IPTV Services
- H.721: IPTV Terminal (Basic)
- H.770 : IPTV Service discovery
- H.761: Ginga-NCL
- H.741.x: Audience Measurement
- H.762: LIME
- H.763.1: Cascading style sheets for IPTV services
- H.264: video

Architecture, requirements, network

- Y.2007: NGN Capability Set 2
- Y.Sup 5: IPTV Service use cases
- Y.Sup 7: NGN Release 2 Scope
- Y.1910: IPTV Functional Architecture
- Y.1901: IPTV Service Requirements
- Q.3010: Authentication protocol

Quality of Experience

- H.701: Content Error-Recovery
- G.1080: IPTV QoE
- G.1081: Performance Monitoring
- G.1082: Improving robustness of IPTV performance

Security and Content Protection

- X.1911: Req & arch for IPTV security

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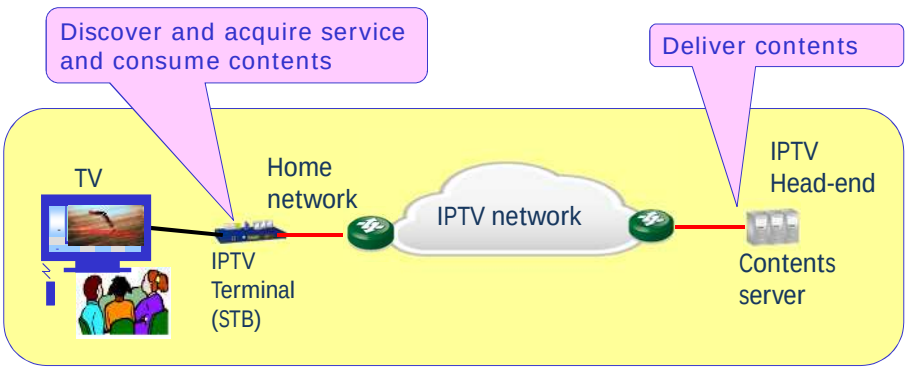
IPTV Testing & Showcasing Conceptual Configuration(1)



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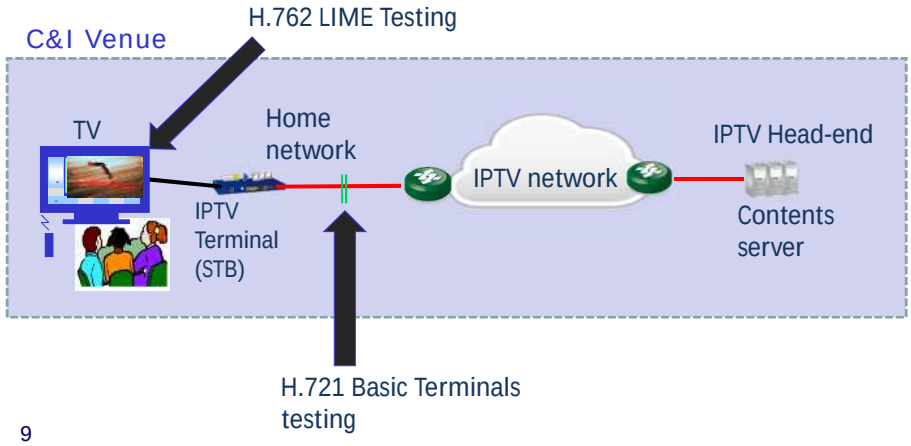
IPTV Testing & Showcasing Conceptual Configuration(2)

- Testing

  C&I testing for ITU-T H.721 and H.762 are using contents servers and terminals.



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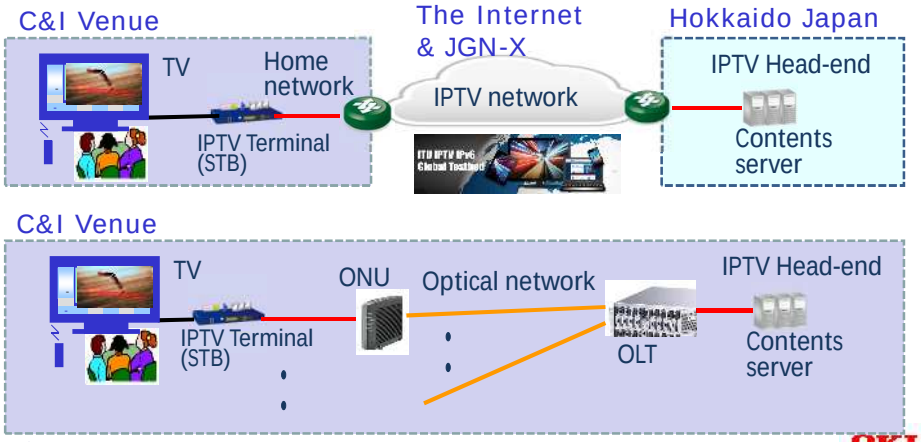
IPTV Testing & Showcasing Conceptual Configuration(3)

- Showcasing

  ITU IPTV IPv6 global testbed (I3GT) and local servers are used fo showcasing



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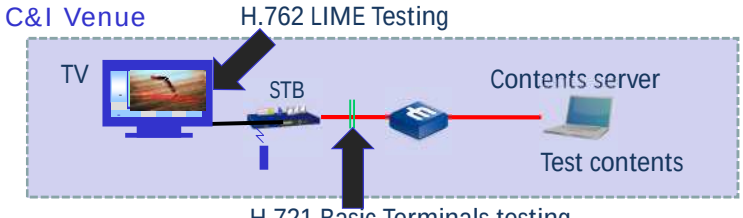
C&I Testing outline(1)

- C&I testing for IPTV are based on ITU-T conformance documents.
  - ITU-T HSTP.IPTV-H721 (Basic Terminal)
  - ITU-T HSTP.IPTV-H762 (LIME)
- Basic IPTV services (VOD and Linear TV) operations are tested based on HSTP.IPTV-H721.
- Display images and remote controller operations over LIME contents are tested based on HSTP.IPTV-H.762
- Test server functions are installed in one laptop.



C&I Testing outline(2)

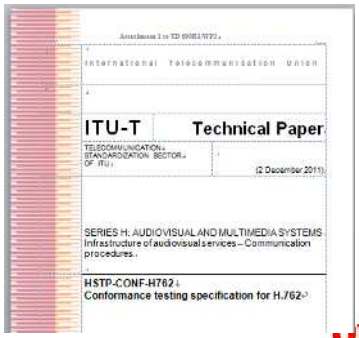
- In ITU-T HSTP.IPTV-H762 (LIME), basic element test, object element test items are described.

Basic element test

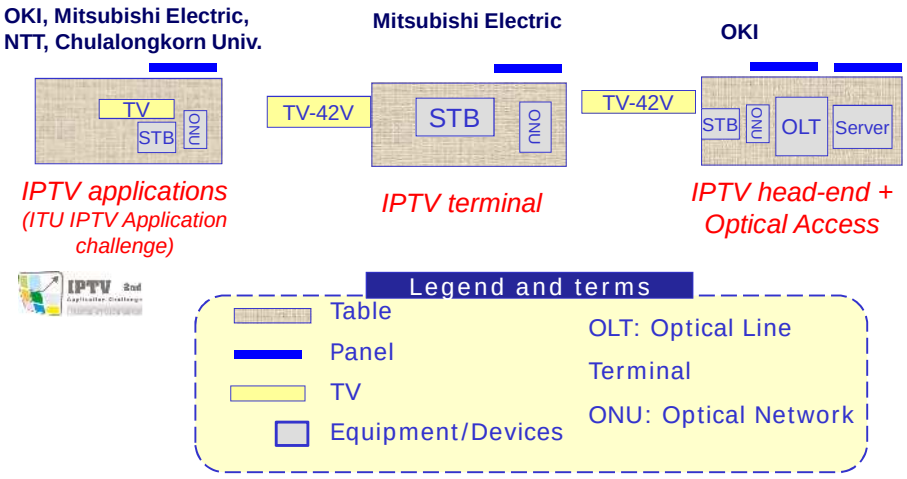
No.	File name	Description
1	docstr0.lime	TBD
2	body-element-test.lime	TBD
3	body-element-test0.lime	TBD
4	body-element-test1.lime	TBD
5	p-element-test.lime	TBD
6	p-element-test0.lime	TBD
7	br-element-test0.lime	TBD
8	div-element-test.lime	TBD
9	div-element-test1.lime	TBD
10	Span-element-test0.lime	TBD
11	Span-element-test1.lime	TBD
12	a-element-test0.lime	TBD
13	a-element-test1.lime	TBD
14	Input-element-test.lime	TBD
15	Input-element-test1.lime	TBD
16	link-css.lime	TBD

Object element test

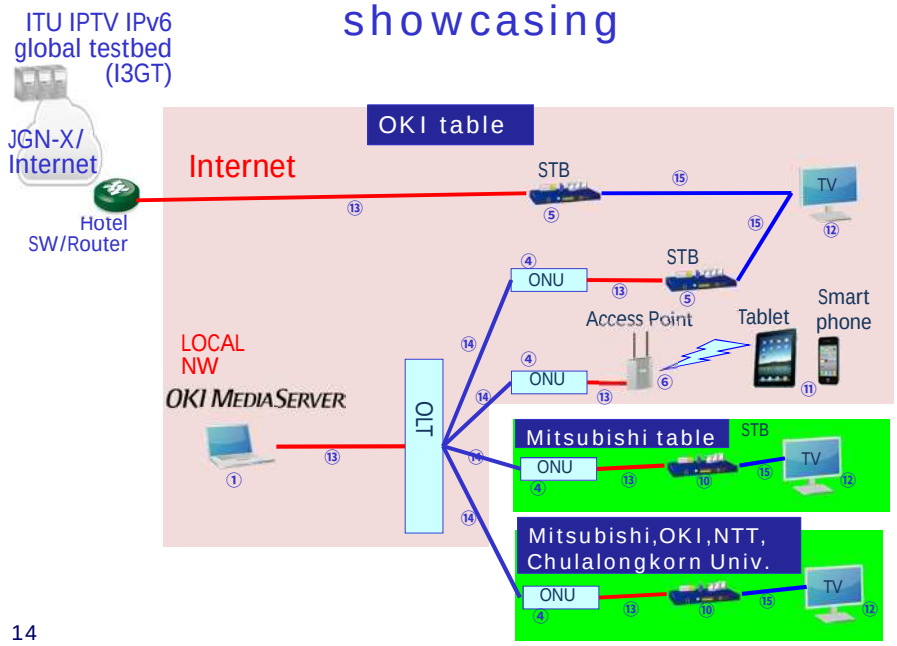
No.	File name	Description
1	object-element-test.lime	TBD
2	object-element-test1.lime	TBD
3	object-element-test2.lime	TBD



IPTV Testing & Showcasing
Layout Image



Physical architecture for IPTV showcasing



Contents for Showcasing

1. LOCAL
   1. VOD and linear TV
      - Love Hokkaido by HTB
      - Sapporo snow festival 2013 by HTB
      - Greetings from Director of ITU-T by ITU-T
   2. LIME application
      - Sign language learning system by Chulalongkorn Univ.
      - Health condition visualization (E-Health) by NTT (poster only)
   3. Others
      - Device shift (STB and Tablet) and time shift application by OKI
2. ITU IPTV IPv6 Global Testbed (I3GT)
   1. VOD
      - The same as the above local "VOD and linear TV" except for Love Hokkaido.

HTB: Hokkaido Television Broadcasting, http://www.htb.co.jp/en/

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IPTV STB by Mitsubishi Electric

Features

◆Multiple services (currently deployed STB)
- ◆Terrestrial and satellite TV broadcast
- ◆Premium channel TV broadcast
- ◆VoD, Revenue-generating interactive services: Karaoke, portal services

◆Personal video recorder, Remote scheduled recording

ITU-T Recommendations supported
- H.721 IPTV Terminal devices – Basic model
- H.762 Lightweight interactive multimedia environment (LIME) for IPTV services
- H.770 Mechanisms for service discovery and selection

Specifications
- Full-HD H.264, MPEG2
- LAN 10/100 Base-TX x1
- USB 2.0 x2 ports for HDD PVR
- HDMI digital Audio/Video
- Stereo audio
- Composite/Component video
- Digital audio
- IR interface (for remote controller)

MITSUBISHI ELECTRIC
Changes for the Better

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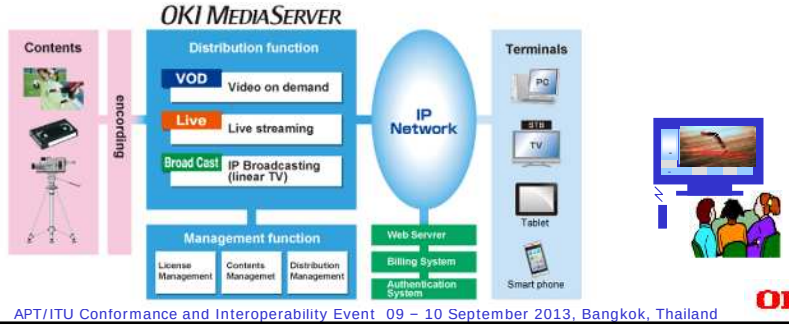
IPTV Head-end by OKI

- OKI MEDIASERVER is an ITU IPTV reference server used in I3GT

- Integrated IPTV Platform
  - VOD, live streaming, IP broadcasting (linear TV) and their combined services such as time shift service (pause-live, catch-up, and start-over)
- Standard based system
  - ITU-T IPTV standards and de-facto standard, IETF HLS, compliant
- Large scale system
  - It supports distributed VOD system for large scale system



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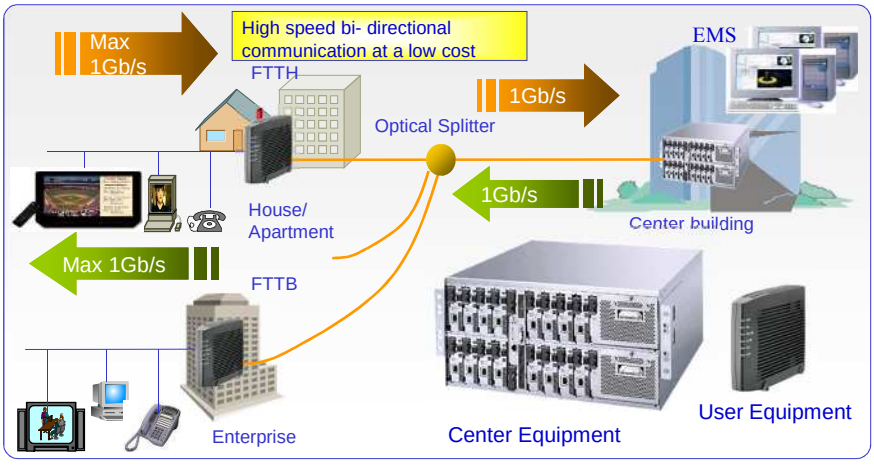
GE-PON Product by OKI

- Provide products to be installed at homes, in apartment and enterprise buildings. for ultrahigh-speed broadband services such as real-time distribution of high quality contents over single optical fiber.



GE-PON: Gigabit Ethernet Passive Optical Network
FTTH：Fiber to the Home FTTB：Fiber to the Building

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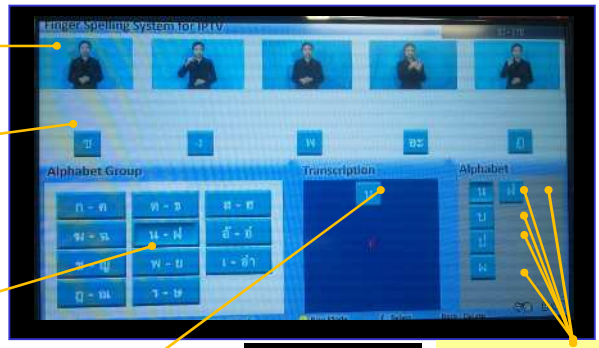
IPTV Applications from ITU
IPTV Application challenge (1)

- The purpose is to provide a method to direct translation between Thai language and Thai finger spelling of Thai Sign language to bridge communication.
- The application is written in LIME (H.762).



Sign language video

Thai language alphabet selected

Thai language alphabet group

Selected character in the group

Alphabets in selected group

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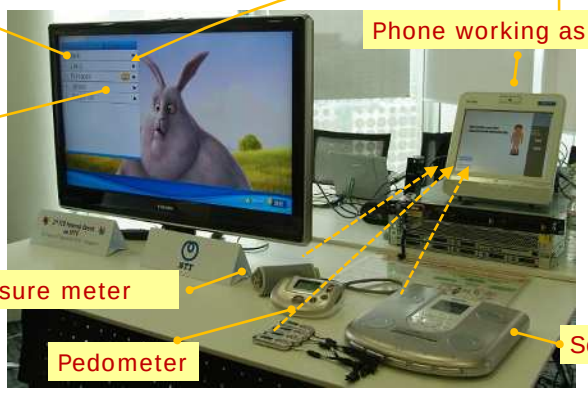
IPTV Applications from ITU
IPTV Application challenge (2)

- Widget implemented with LIME (ITU-T H.762) for e-health information collected from the user site, consolidated in the server backend and displayed on users' IPTV terminal device as a widget.



Consolidated reports

Server

IPTV widget

Phone working as gateway

Normal programme from IPTV server

Blood pressure meter

Pedometer

Scale

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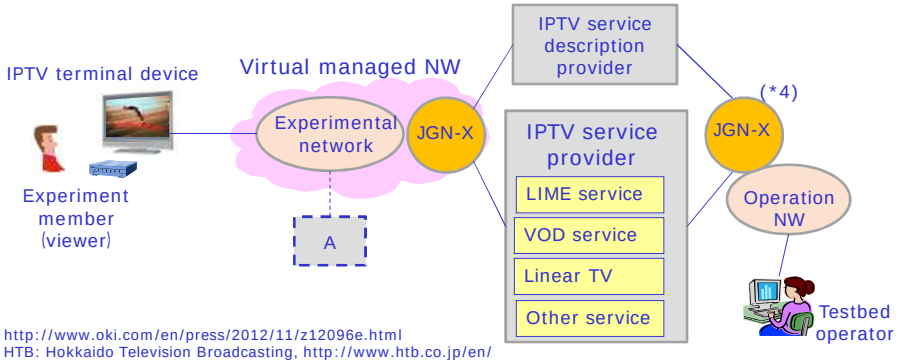
ITU IPTV IPv6 Global Testbed (1)

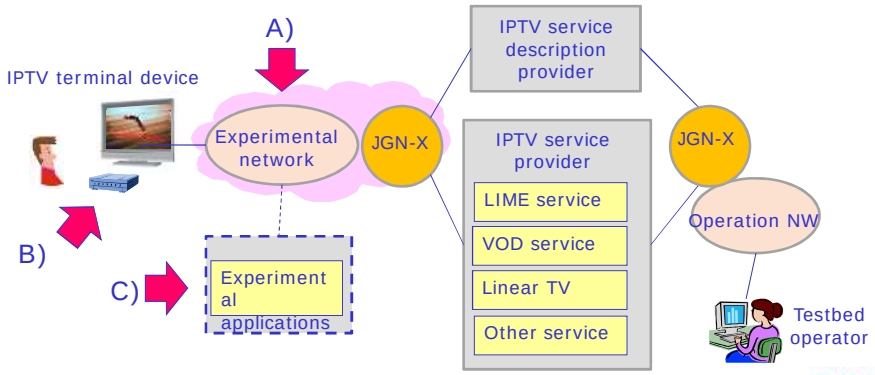
- ITU IPTV IPv6 Global Testbed (I3GT) (*1) is a testbed for the parties that are interested in ITU IPTV standards and IPv6 network.
- I3GT was developed by OKI and HTB(*2) in October, 2012 in the cloud environment of NICT(*3).
- I3GT was demonstrated in WTSA-12, Sappro Snow Festival experiment 2013 by NICT, and ITU Kaleidoscope in Kyoto.



(*1) http://www.oki.com/en/press/2012/11/z12096e.html
(*2) HTB: Hokkaido Television Broadcasting, http://www.htb.co.jp/en/
(*3) NICT: National Institute of Information and Communications Technologies, http://www.nict.go.jp/en/
(*4) JGN-X (Japan Gigabit Network -eXtreme), http://www.jgn.nict.go.jp/english/index.html

ITU IPTV IPv6 Global Testbed (2)

- *Test items (for examples, not limited)*
  - A) Network bandwidth and quality (delay, loss) suitable for IPTV
  - B) IPTV applications based on LIME standard specifications and so on.
  - C) Prototype of your own terminals and /or IPTV applications for future commercial services.



Conclusions

- In APT / ITU C&I event:
  - IPTV Testing
    - Confirm interoperability on H.721(IPTV basic terminal), and H.762(LIME) between server (OKI) and STB (Mitsubishi Electric)
  - Showcasing
    - Demonstrate streaming from ITU IPTV IPv6 Global testbed in Japan to Thailand
    - Demonstrate interactive applications between server and STB / tablet.
    - Demonstrate IPTV application programs in ITU Application challenge (NTT, Chulalongkorn Univ.)
- Future directions
  - More participants and new testing are expected in future events.

Thank you