WORLD TELECOMMUNICATION
STANDARDIZATION ASSEMBLY

ITUWTSA-20
GENEVA2022

1– 9 March 2022
Geneva, Switzerland

ITU-T STUDY GROUP 9

Broadband Cable and Television

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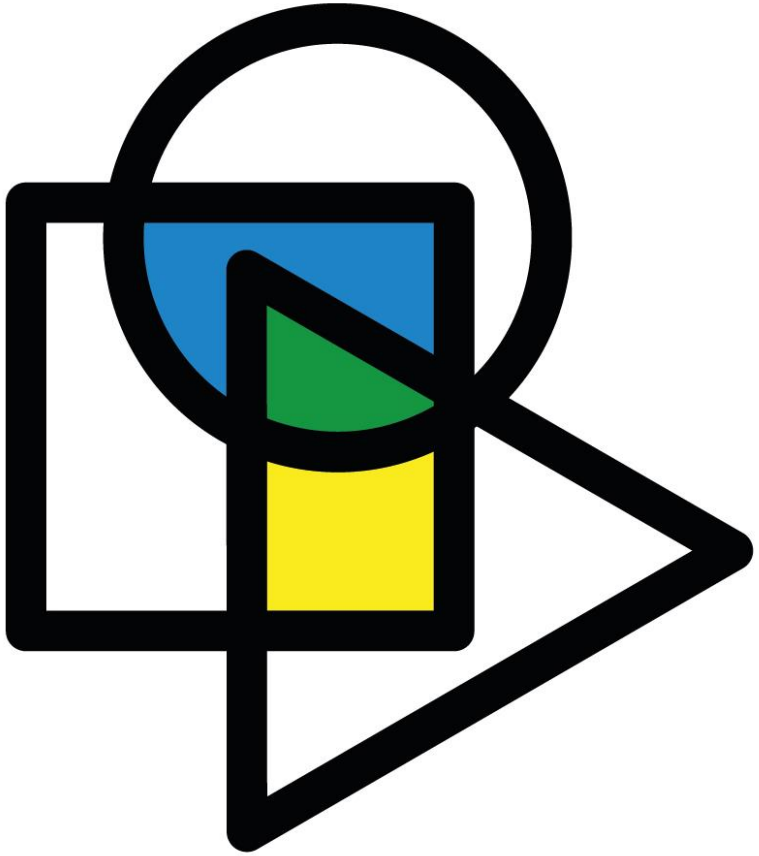
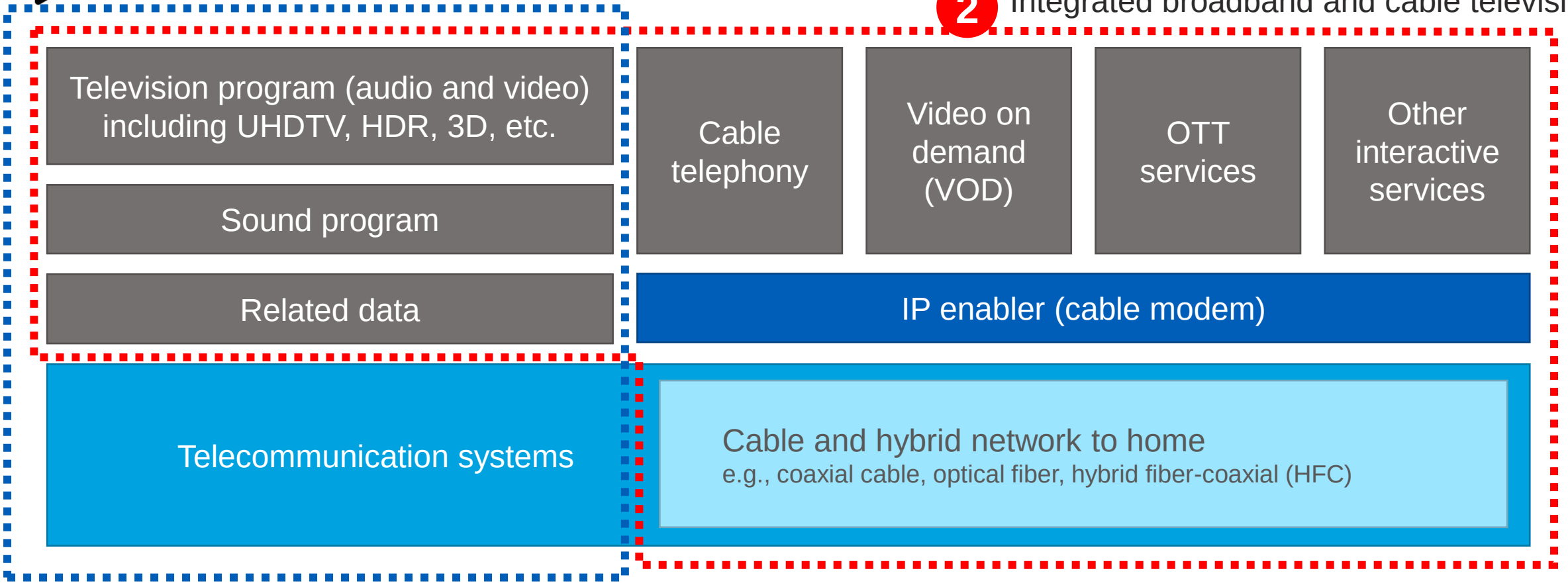
March 2022



AGENDA

- RESPONSIBILITIES OF SG9
- SG9 ACHIEVEMENTS IN SP 2017-2021
  1) Evolution of cable
  2) BSG
  3) CA/DRM
  4) Introduction of AI
  5) Accessibility
  6) Terminal device
  7) Strategic Management
- FUTURE WORK IN SP 2022– 2024
- ADDITIONAL SLIDES

RESPONSIBILITIES OF SG9



1 Television and sound program transport for

- Contribution: studio to broadcasting station
- Primary distribution: broadcasting station to cable television headend
- Secondary distribution: cable television headend to home

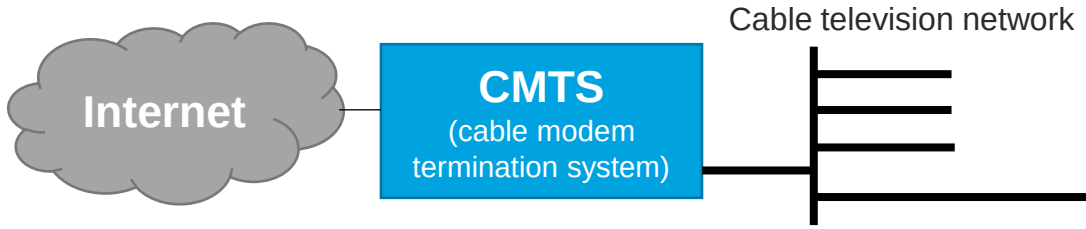
ACHIEVEMENT 1 – EVOLUTION OF CABLE

Cable modem Recommendations (DOCSIS*-related)

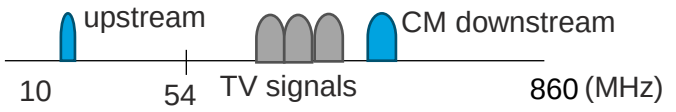
*DOCSIS: Data Over Cable Service Interface Specifications

J.225 (2020)	Fourth-generation transmission systems for interactive cable television services – IP cable modems
J.224 (2019)	Fifth-generation transmission systems for interactive cable television services – IP cable modems

Typical configuration of Internet access over cable television network



Spectrum usage example



SG9 Recommendation	DOCSIS Version	Downstream Phy Rate (examples for 6MHz system)	Upstream Phy Rate
J.112 (1998)	DOCSIS 1.1	42 Mbps	10 Mbps
J.122 (2002)	DOCSIS 2.0	42 Mbps	30 Mbps
J.222 (2007)	DOCSIS 3.0	(42 x n) Mbps (1 Gbps max)	(30 x n) Mbps
J.223 (2016)	C-DOCSIS	(42 x n) Mbps (1 Gbps max)	(30 x n) Mbps
J.225 (2020) NEW	DOCSIS 3.1 (4th gen)	10 Gbps max	2 Gbps max
J.224 (2019) NEW	DOCSIS 4.0 (5th gen)	10 Gbps max	6 Gbps max

ACHIEVEMENT 2 – BSG

J.298 (2018)	**Requirements and technical specifications of cable TV hybrid set-top box that has the compatibility with terrestrial and satellite TV transport**
	Defining requirements and technical specifications of streamlined and cost-effective cable TV set-top box having signal reception capability of terrestrial and satellite broadcasting.
J.1401 (2021)	**Television Content Distribution Platforms: Requirements for Open Access and Signal Quality**
	A standard interface to allow broadcasters to distribute their TV programs with guaranteed quality over cable TV networks built as a national infrastructure.
J.Sup.11 (2021)	**Installing a digital TV service for cable networks and relating Recommendations**
	A supplemental document providing a collection of the useful SG9 Recommendations to facilitate developing counties to construct an infrastructure for cable television services.

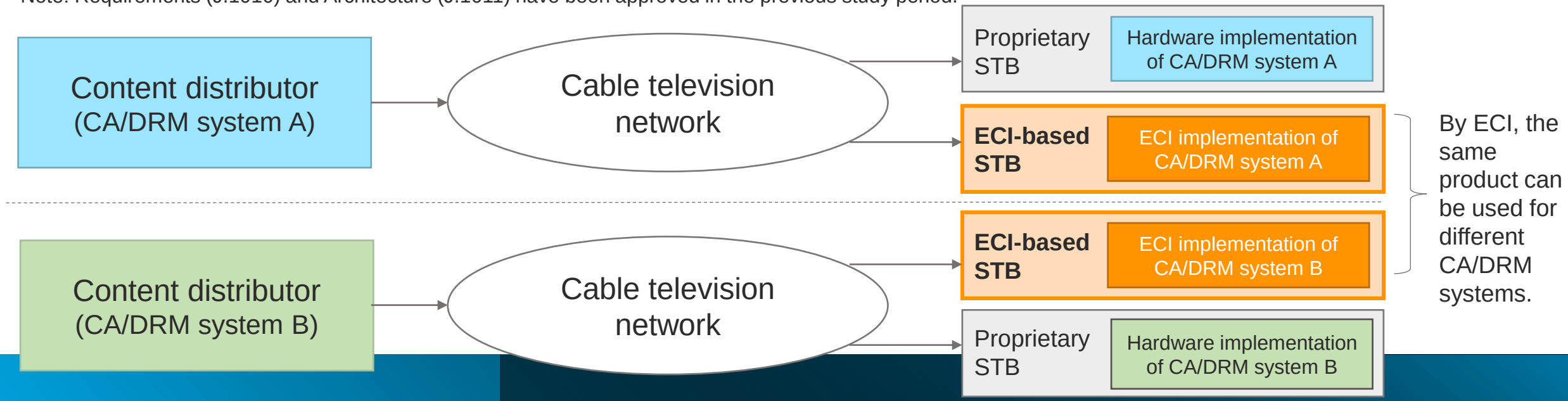
ACHIEVEMENT 3 – CA/DRM

*CA: conditional access
DRM: digital rights management

Recommendations for embedded common interface (ECI) for exchangeable CA/DRM solutions

J.1012 (2020)	CA/DRM container, loader, interfaces, revocation
J.1013 (2020)	The virtual machine
J.1014 (2020)	Advanced security – ECI-specific functionalities
J.1015 (2020)	The advanced security system - Key ladder block
J.1015.1 (2020)	The advanced security system - Key ladder block : Authentication of control word-usage rules information and associated data 1

Note: Requirements (J.1010) and Architecture (J.1011) have been approved in the previous study period.



ACHIEVEMENT 4 – INTRODUCTION OF AI

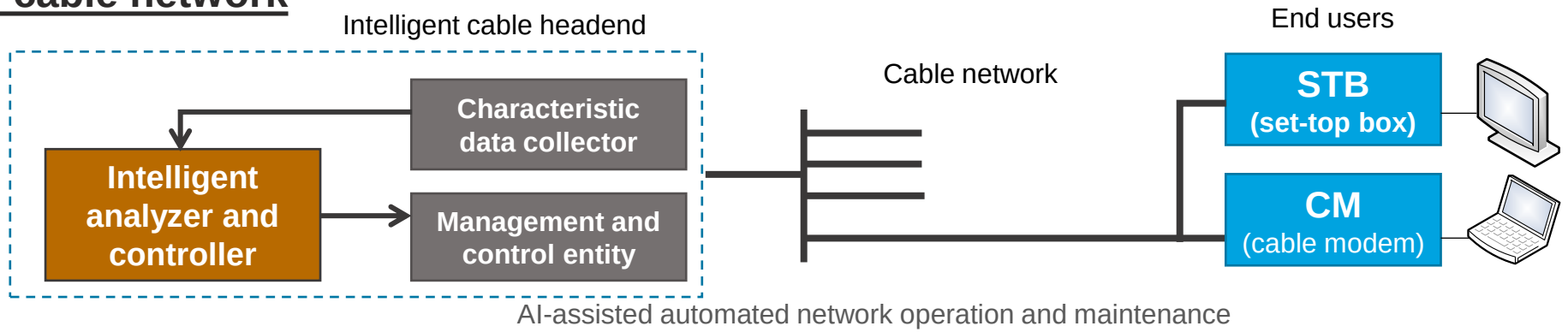
New Question for artificial intelligence (AI)

Q12/9	**AI-enabled enhanced functions over integrated broadband cable network**

First ITU-T Recommendation that introduced AI

J.1600 (2019)	**Premium cable network platform – Framework**
	Premium cable television network platform that introduced cloud-based AI to facilitate intelligent and automated network operation and maintenance.

Premium cable network



ACHIEVEMENT 5 – ACCESSIBILITY

New Question for accessibility

Q11/9	**Accessibility to cable systems and services**

New work item related to accessibility

This work is being conducted under the framework of IRG-AVA (ITU-T SG9, SG16 and ITU-R SG6).	
J.acc-us-prof	**Requirements for a Common user profile to personalize audiovisual content**
	Defining a common user profile framework to offer personalized service including adaptive user interface to people with different range of capabilities.

Example of parameters of the common user profile defined in J.acc-us-prof

- Background and foreground color
- Audio volume
- Minimum font size
- Minimum color contrast
- Cursor (minimum size, color, speed)
- Subtitle (minimum font size, speed, language, maximum latency, caption box size)
- Screen icon (size, spacing)
- Audio output language

ACHIEVEMENT 6 – TEREMINAL DEVICE

Smart TV operating system

J.1201	Functional requirements
J.1202	Architecture
J.1203	Specification
J.1204	Security framework
J.1205	Hardware abstract layer (HAL) API

Set-top box (STB)

J.297	4K ultra HDTV STB
J.298	Cost effective multi-mode STB
J.299	Auto configuration server for STB

Smart home gateway

J.1611	Functional requirements
J.1612	Architecture

One-way downloadable conditional access system

J.1026	Requirements
J.1027	System architecture
J.1028	Terminal system

Two-way downloadable conditional access system

J.1031	Requirements
J.1032	System architecture
J.1033	Terminal system

ACHIEVEMENT 7 – STRATEGIC MANAGEMENT

Strategic approach to increase the momentum of SG9

A series of workshops on “Future of Television” (targeting different regions of the world) were organized in collaboration with the three Sectors of ITU.

1	2017	Hangzhou, China	
2	2018	Geneva, Switzerland	
3	2018	Bogota, Colombia	
4	2019	Geneva, Switzerland	
5	2020	Virtual	*Originally planned in Tokyo and Gambia, respectively.
6	2021	Virtual	

✓ All these events were collocated with the SG9 meetings and collected up to **350 unique participants** in the recent editions.

Summary of SP 2017 – 2021

	In SP 2017 – 2021	In SP 2013 – 2016
Number of participants of SG9 meetings	**62** *1 **(+44%)**	43 In average
Number of Recommendations approved	**66 (+129%)**	31 *2
New members who joined ITU-T to attend SG9	**9** Cox Communication, CableLabs, Sky Group, Skyworth Digital, JiShi HuiTong,Indian Institute of Science, and Huazhong University, MovieLabs *3, Synamedia *3	

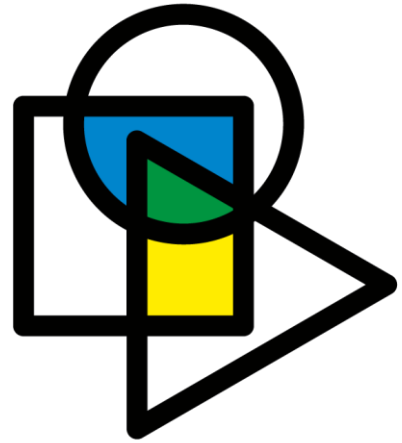
*1: Average of the recent four meetings

*2: Excluding those Recommendations related to quality assessment which have been removed from SG9 at WTSA-16.

*3: have recently discontinued their membership

FUTURE WORK IN STUDY PERIOD 2022-2024

Evolution of cable television network	Further enhancement of ultra-high-speed cable modem
	Unified coaxial and optical platform
	Adaptive bit rate multicast (m-abr) transport for cable network
Advanced services	Advancement of set-top box (STB) and smart home gateway
	Cloud-based platforms for virtual reality (VR) and gaming for cable
	Common user profile format for audiovisual content accessibility
Outreach and promotion	Continue fostering meetings of SG9 in the regions, especially when physical meetings are resumed.
	Continue the successful workshop series on “Future of TV”, in collaboration with ITU-R and ITU-D as well as ITU regional offices



ITU WTSA-20

GENEVA2022

Setting the standard

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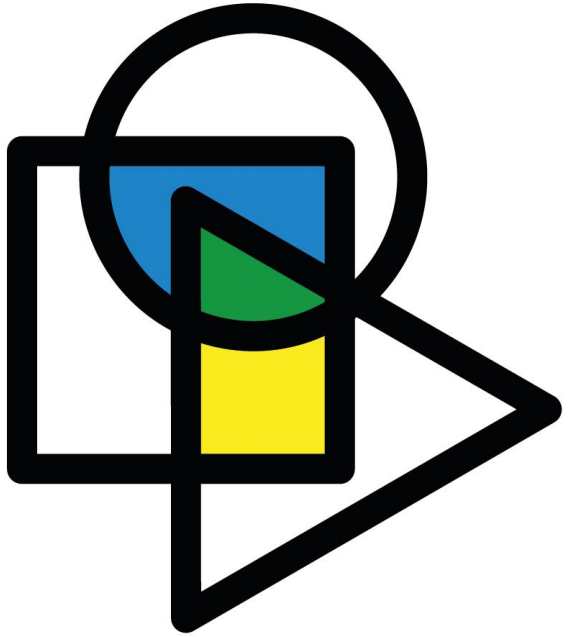


ADDITIONAL SLIDES

KEY MISSIONS IN SP 2017 – 2021

Bridging the Standardization Gap (BSG)

- considering requirements from various regions
- implementation and deployment guidelines for developing countries

ITU-T BRIDGING THE STANDARDIZATION GAP

Evolution of cable television networks

- ultra-high speed cable modems
- robust and flexible security
- high-efficiency transport technology, etc.

Innovative services

- advanced definition video experiences (4K/8K/HDR etc.)
- high realistic experiences (VR/AR etc.)
- integrated broadcast and broadband services, etc.

MANDATE OF SG9

- **ITU-T SG9: Television and sound transmission and integrated broadband cable networks**
- **Responsible for studies relating to:**
  - use of telecommunication systems for contribution, primary distribution and secondary distribution of television, sound programmes and related data services including interactive services and applications, extendable to advanced capabilities such as ultra-high definition, 3D, multiview and high-dynamic range television, etc.;
  - use of cable and hybrid networks, primarily designed for television and sound-programme delivery to the home, as integrated broadband networks to also carry voice or other time-critical services, video-on-demand (e.g. over-the-top (OTT)), interactive services, multiscreen services, etc. to customer premises equipment (CPE) in the home or enterprise.
- **Lead Study Group Roles**
  - integrated broadband cable and television networks

MANAGEMENT TEAM

Role	Name
Chairman	Mr Satoshi MIYAJI (KDDI, Japan)
Vice-Chair	Mr Blaise Corsaire MAMADOU (Central African Rep.)
Vice-Chair	Mr TaeKyoon KIM (ETRI, Korea Rep. of)
Vice-Chair	Mr Zhifan SHENG (NRTA, China)

Role	Name
Advisor	Mr Stefano POLIDORI (SGD, TSB)
Administrative Assistant	Ms Hiba TAHAWI (SGD, TSB)

SG9 STRUCTURE

ITU-T SG9

WP1/9 — Cable transport including video and data

Chair: Mr Zhifan Sheng
Vice-Chair: Mr Blaise Corsaire Mamadou

- Q1/9 Television and sound transmission
- Q2/9 Conditional access and content protection
- Q4/9 Guidelines for implementations and deployment
- Q6/9 Set-Top Box and terminals
- Q7/9 Cable television delivery of IP packet-based data (cable modems)

WP2/9 — Cable platforms and applications

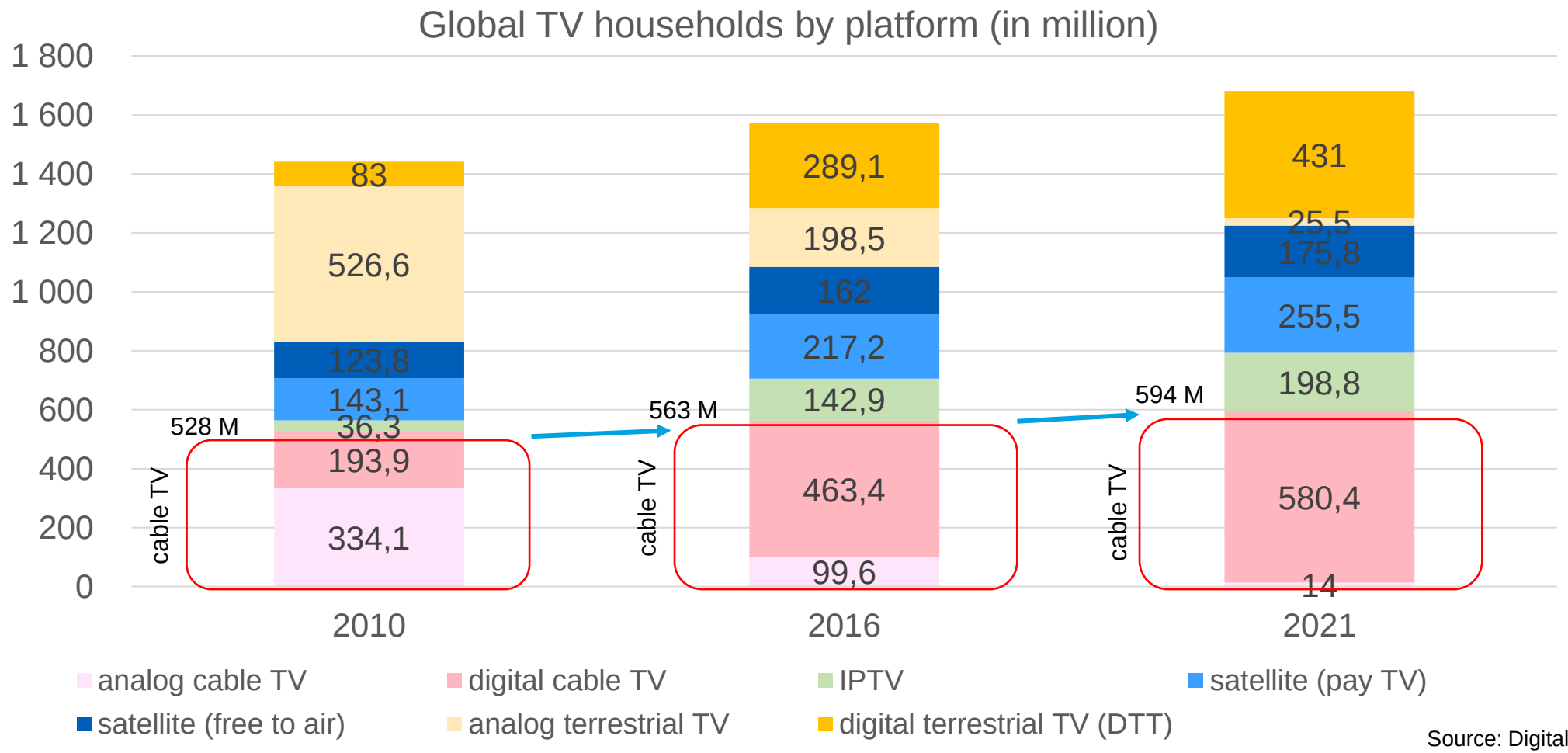
Chair: Mr TaeKyoon Kim
Vice-Chair: Mr Eric Wang

- Q5/9 APIs for advanced content distribution services
- Q8/9 Voice and video IP applications over cable television networks
- Q9/9 Advanced service platforms
- Q11/9 Accessibility to cable systems and services — Started in Apr 2020
- Q12/9 AI-enabled enhanced functions over integrated broadband cable network — Started in Apr 2021

Q10/9 Work Programme, Coordination and Planning

TV HOUSEHOLD IN THE WORLD

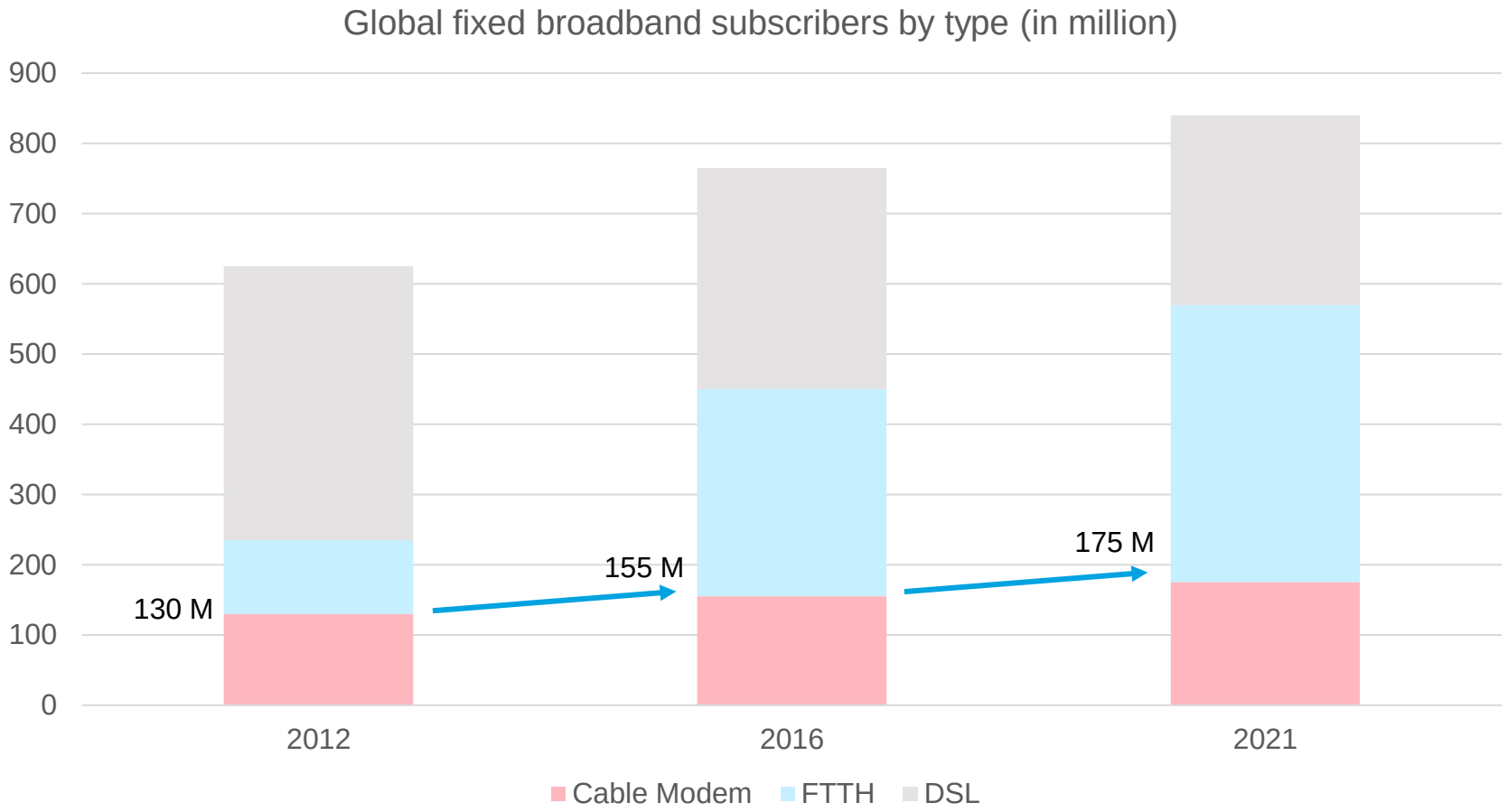
Cable television is still growing and dominant as 35% global share.



Source: Digital TV Research

CABLE TELEVISION AS BROADBAND ACCESS

Cable TV Internet is still growing.
“Cable Modem” can provide gigabit high-speed Internet by DOCSIS 3.0, 3.1 and 4.0.



Source: Broadbandtrends

SG9 HIGHLIGHTS IN THE PAST STUDY PERIOD

2000	**Digital Cable Television and Emerging IP Technology**	
	J.83 (1995): Digital cable TV modulation	J.112 (1998): Cable modem – DOCSIS1.0
	J.90 (1998): Electronic program guide	J.132 (1998): MPEG-TS transport over SDH
2001 – 2004	**DOCSIS2.0, Cable Telephony (VoIP), Optical Transport**	
	J.122 (2002): Cable modem – DOCSIS 2.0	J.185, J.186: Cable TV over FTTH (RF-based)
	J.160~J.179: Cable telephony (MGCP)	J.190 (2002): Home Network Architecture
		J.200～J.202: Interactive TV applications
2005 – 2008	**DOCSIS3.0, Advanced Television Experience, IPTV**	
	J.83rev (2007): 256QAM addition to Annex C	J.601 (2005): Large screen digital imagery
	J.210～J.214, J.222.0~J.222.3: DOCSIS3.0	J.700 (2007): IPTV framework for cable TV
	J.360～J.370: Cable telephony Ver.2 (SIP)	J.901 (2008): Free viewpoint television (FTV)
2009 – 2012	**Integrated Broadcast and Broadband, Hybrid Terminal**	
	J.205, J.206 (2012, 2013): IBB framework	J.380.1～8, J.706, J.707: Target advertisement
	J.295, J.296 (2012): Hybrid set-top box	J.381 (2012): Advanced cable transport
		J.603 (2011): 4K/8K real-time transmission
2013 – 2016	**Evolution of Transport Technologies**	
	J.183rev, J.288 (2016): 4K/8K QAM transport	J.301, J.302 (2014 – 2016): Augmented Reality
	J.195, J.196 (2014 – 2016): HiNoC v1 and v2	J.382 (2014): DVB-C2
	J.223 (2016): Cabinet DOCSIS (C-DOCSIS)	J.1010, J.1011 (2016): Exchangeable CA/DRM

COMMERCIALIZED RECOMMENDATIONS

J.382	J.343.1	J.343 series
Demodulator LSI	**Quality measurement software**	**Video quality evaluation software**
In 2016, Sony released the world‘s first commercial demodulator LSI for advanced digital broadcasting supporting 4K/8K including J.382 for cable TV networks.	Rohde & Schwarz / Swiss Qual released network quality measurement software for smartphone “QualiPoc Android,” where J.343.1 (J.bitvqm) quality evaluation method is implemented.	Qpticom relased video qualilty evaluation software product “PEVQ-S,” where J.343.5, J.343.6 (full reference with bitstream analysis) and J.247 (full reference) are employed.

J.295, J.296	J.195, J.196	J.205～J.207
Hybrid set-top box	**HiNoC modem LSI**	**Hybrid broadcasting system**
In 2012, KDDI launched commercial cable TV hybrid set-top box “Smart TV Box,” which is compliant with J.295 and J.296, equipped with Android operating system.	Haier IC released HiNoC 1.0 LSI (Hi 3601, Hi 309, Hi 2610) capable of 112 Mbps speed at 16 MHz. Hannuo Semiconductor released HiNoC 2.0 LSI (HN1000) capable of 1.14 Gbit/s at 128 MHz bandwidth.	In 2010, HbbTV has started in Germany, subsequently deployed in NL, FR, ES, PL, UK, FI, CH, IT, Austraria, New Zealand, Saudi Arabia, etc. In 2013, Hybridcast has been launched in Japan.

COMMERCIALIZED RECOMMENDATIONS

ITU-T SG16
ITU-R SG6
ITU-D
and other Study Groups

TC100

TC Cable
ISG ECI

and all other organizations as qualified by ITU-T A.4, A.5 and/or A.6