100/AGSxxx

Report of Study Session 10 (Multimedia cyber technology)

By J. Yoshio

After the discussion of SS 10 in San Diego Plenary, there was no further input.

PL slightly revised the outline, it will be discussed in PT 100-17 in 25 May. After that PL will make DTS.

The followings are the revised outline.

100_PT100_17(Brussels_Yoshio)

Study Session 10/PT 100-17
- Multimedia cyber technology

TR outline updated

at SS 10/PT 100-17
on 25 May, 2018
by Junichi Yoshio

1

Introduction
Current situation of IoT/CPS in TC 100 area

- Mainly smartphones or PC and their services provide IoT/CPS as AV&IT multimedia applications.
  - Netflix, iTunes provide VOD.
  - Apple TV, Google Chromecast provide Smart TV, Connected TV.
  - Apple Music, Google Play Music provide MOD and Music Locker.
  - Apple, Google and others provide many Internet services.
  - eBook service provider provides cloud service.
  - Smartphone application provides various IoT services such as location based application, user's data based services.

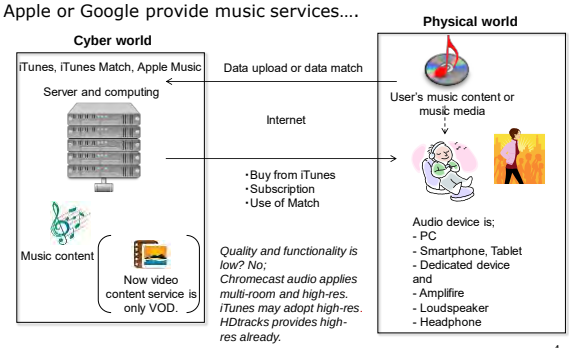
2

- Not so soon, the primary client of AV&IT multimedia will become only the following components;
  smart phone, smart watch, PC and AV amplifier, loudspeaker or headphone, monitor device, microphone, camera and other interface devices.
  There will be no player, receiver, STB.
- The entity of content and service is located in cyber system such as cloud or server.
  - Physical system is disadvantage in any cost aspect of developing, manufacturing and maintenance.
  - Only a small part of high-end system will be exist in physical.

3

Example: Music services

Apple or Google provide music services….



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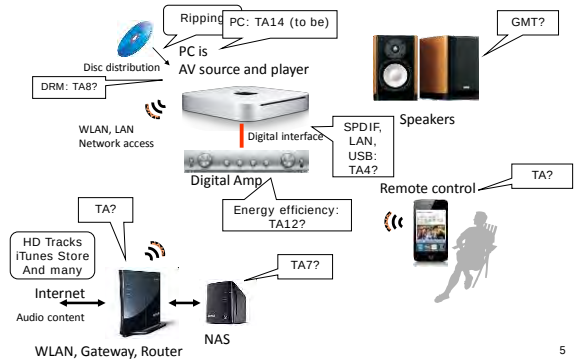
Example: Audio system
(from a presentation in 2010 October)



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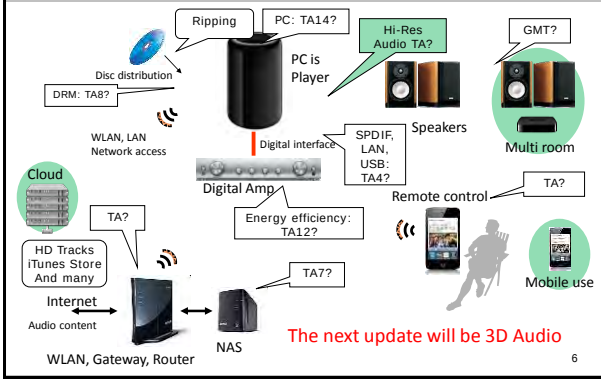
Example: Audio system
(Updated in 2017)



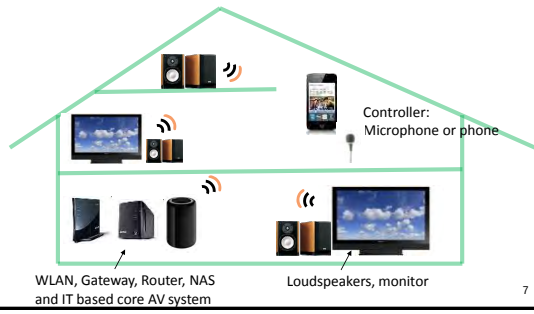
The next update will be 3D Audio

6

Addendum

Shift to the future

- There were many equipment dedicated one functionality, but in the future, the system will be simplified.



7

Example: In car

- Car main AV device + Smartphone (Apple CarPlay, Google Android Auto) increase its market
  - Many types of this kind of systems;
  - Basic AppRadio type + Smartphone = Music Player
  - Advanced AppRario type + Smartphone = Music, Mail, Navigation and more
  - AV receiver type + Smartphone + Wi-Fi transmission (Miracast, etc.) = Video, Audio Player
- This system provides not only AV but also navigation and many services of Internet.


8

- This system makes consumer disk media and player disappeared.
- Also user may not need to keep physical media of music and video in home.

9

- Most of content will exist in cyber system.
- User's client device will be such as PC/Tablet and Smartphone or the device based on PC and Smartphone architecture.
- Player and STB will be disappeared, but the reproduction key device such as DAC, digital amplifier, monitor, loudspeaker will exist.
- Further more, AV content editing or modification will be done in cyber system.

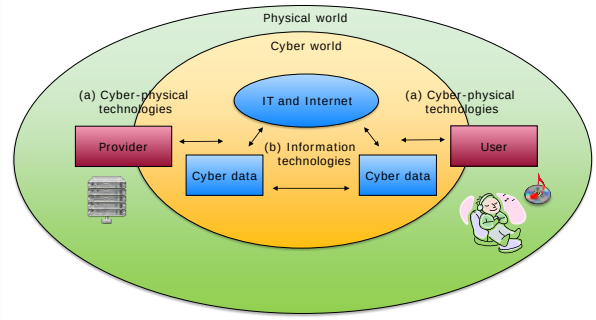
10

Added value CPS services

- Audio system
  - Currently service is content only, other information service is quite limited.
    - Jacket picture is provided but no liner notes, related information
    - Some information, for instance a link to YouTube is provided
  - No 3D audio yet
    - Need format, interface
- Car system
  - Many CPS service are on the way
    - Smartphone base audio service becomes popular
    - HUD+AR will be launched soon
    - Digital signage service is still limited
    - Surround view monitor is standardized by TA 17, there will be more additional value services
    - Drive monitor + CPS starts in some application

11

System model



12

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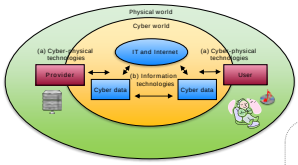
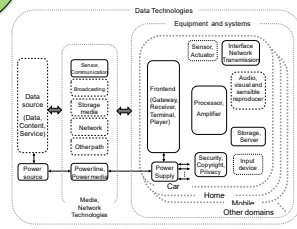


TC 100 model from IEC61998 Ed.2



- The TC 100 model from IEC 61998, describes whole system, it includes cyber-physical system.

Revised

Device to CPS system	IEC TC 100 standardization
Application	Not yet
Platform	Not for TC 100
Wide area network	Not for TC 100
Local area network	TA 8, ECHONET, Network configurator
Device	Each TA

Addendum

TC 100 items in each

- Application
  - CPS/IoT application
- Platform
  - (file format, data format)
- WAN
  - none
- LAN
  - Network config, Gateway, Terminals
- Device
  - Legacy devices, Terminals, CPS/IoT devices

New area other than existing audio and video services

- Connected car, connected device (i.e. Wearable device) will need data process (big data) to provide users new services such as concierge and infotainment.
  - Video data through cameras installed in car will be processed to be used as a service or information.
  - Data from wearable device will be used for a service or information.
- Content/data recognition or categorization including deep leaning and AI
  - For example, to provide automatic content arrangement service, or to provide recommended content.

Use case

- Methodology of computing AV data to provide well quality reproduction
  - QoS of network and AV requirement
  - Cyber system processes of AV data with network
    - E.g. Format conversion, modification of AV data
- Measurement method for the minimum client devices and systems
  - For UI, IF, transmission, file format, and for device such as monitor, loudspeaker.
- Management method for devices and systems in network
- Unified management method for content
  - Minimum unification of data format
    - Enhance network configuration (IEC 62608) and DRPC (IEC 62227) to manage content data

17

Cont'd

- Content management with network
  - File structure (format) (e.g. Huge capacity UDF+Network capability)
  - Meta data (e.g. permission code)
  - Content semantics analysis and data structure (for search, manage, and application usage)
- AV signal processing schemes
  - Digital data processing in cyber world
- QoS issues
  - Latency, Delay
  - Network management
  - Quality

18

Cont'd

- (Big) data processing (with deep leaning or AI)
  - Date from wearable, health or car device is processed to provide a new service or information.
  - Music and video service can recognize what content is used, how used, where it was used, etc. that is information for providing a new services.
- Content/data recognition or categorization including deep leaning and AI
  - For example, to provide automatic content arrangement service, or to provide recommended content.

19

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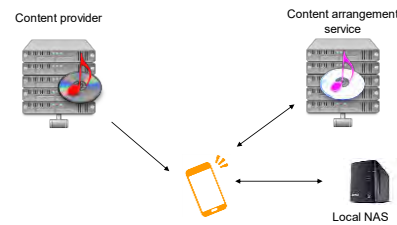
- Distributed system with IoT
  - IoT with IPv6 provides distributed system of AV content.
    - Distributed file
  - Also it provides distributed AV & IT system and equipment.



20

Cont'd

- AI assisted information services
  - Like Siri, OK Google, Cortana, Amazon Echo/Alexa, voice input – voice output or functional action becomes popular.
  - This requires a hardware of microphone-earphone(or loudspeaker) and smartphone or its like devices. This is good system as wearable smart device, it is so-called concierge service or personal assistance.

From Apple

From SONY

21

- AAL area
  - Audio information assistance area
    - Personal assistance service
    - Assistive listening functionality in CPS
  - Visual information assistance area
    - Not yet but eye wear type device is expected for XR
  - Cognitive assistance area
    - Watch service with TC 100 devices
    - Wearable and TC 100 devices based assistance service

22

Audio CPS model is expanded to video and information CPS

- It is already in practice such as iTunes video.
  - There is copy right issue in this model, however it can be solved in contract basis as iTunes dose.
  - On the other hand, existent video content that user has cannot be in cyber domain because of coy right, it needs to be solved.
  - For information, it is already in cyber domain such as Google drive and so on. However there is no universal usage scheme for all kind of such cyber domain services.
    - If audio video users want to access the information regarding audio video content such as liner notes or content information, there is no such universal method for accessing to services.

23

Google

Chrome cast

Apple TV

amazon

Amazon Fire TV

- No compatibility, user needs to use each service.

-There is no such service like iTunes mach.

- Content information is limited.

24

- Solution
  - IEC 62912 of TA8 could be one solution, such standard to use cyber content is required.
  - But video content especially Hollywood movie requires highly copyright protected system, so we need to consider that.

25

Addendum

Video information/infotainment

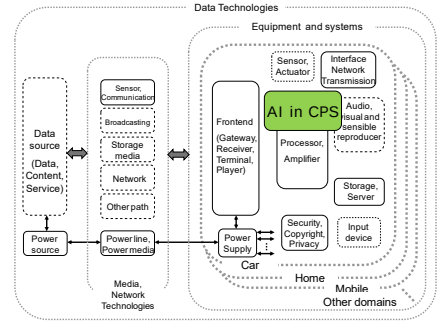
- Video superimpose is a legacy technology of this kind of system, the modern technologies will provide followings.
  - Video + Information integrated system
    - Video and related information not video, such as video streaming services.
  - Video with synthesized information system
    - Video and information integration with visual form, such as XR system.
  - TC 100 is already working on these items, 1) IEC 63033 (Drive monitoring), 2) PT 100-18 (AR VR), 3) 100/AGS/757 (XR).

26

AI in CPS

- Further more about AI
  - AI assisted information service and control with audio (voice and talk) is popular now, AI will be incorporated into CPS in any aspects.
  - User interface
    - Visual and audio assistant avatar as visual content and in XR system
  - Processing
    - Background functionality for processing date, for such as;
      - Recommended music selection
      - Arrangement of user's audio visual content
      - Analysis of user's behavior for better user interface

27



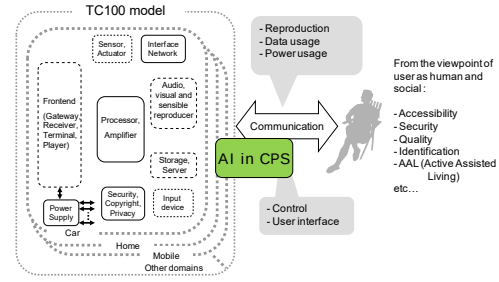
28

Addendum

Equipment and systems with AI

- In cyber form of equipment and systems, AI can do these.
  - System configuration fitted for user requirement.
    - For instance, configuration is programing. AI can configure that and update.
  - System setting and operation.
    - Not manually, AI can do these depending on user requirement. For instance, providing adequate loudness and gamut.

29



30

Addendum

In communication between system and user with AI

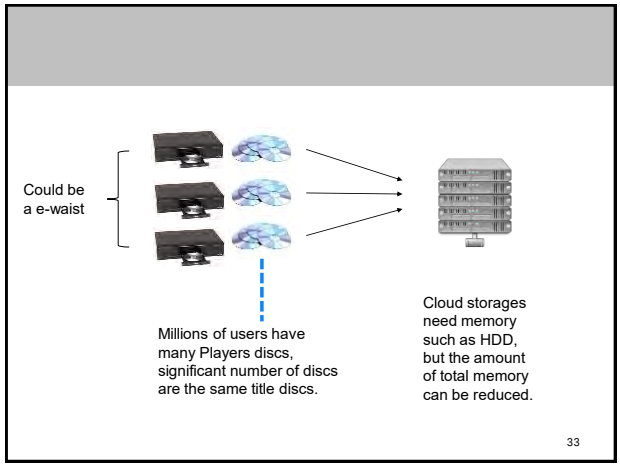
- AI can do more than the current machine does.
  - Control and user interface
    - Voice control or other physical control
    - Guess user feelings or requirement
  - Accessibility
    - Adopt to user's ability
      - Hearing, visible, sensing
    - User identification
      - Other than fingerprint detection such as face id
  - AAL
    - With above technologies, the system can adopt AAL.

31

Environmental aspect of CPS

- CPS shifts any physical properties to cyber domain, this means e-waist can be reduced, also the electric power used for device and equipment is reduced.
  - The content in CD, DVD and BD or Tapes, HDD can be in cyber domain.
    → reduce physical memory devices amount.
  - Audio video data player, receiver or processing function is executed in cyber domain.
    → reduce physical equipment.

32


Could be
a e-waist
Millions of users have
many Players discs,
significant number of discs
are the same title discs.
Cloud storages
need memory
such as HDD,
but the amount
of total memory
can be reduced.
33