

## Study Session 10 - Multimedia cyber technology

at AGS  
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Room  
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## 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.

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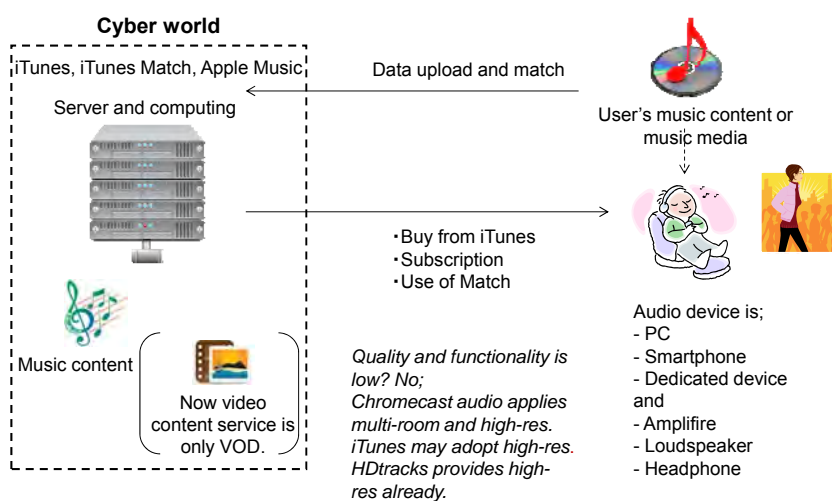
## Hereafter...

- ❖ 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.

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## Example: Music services

Apple or Google provide music services



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## 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 AppRadio 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.



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

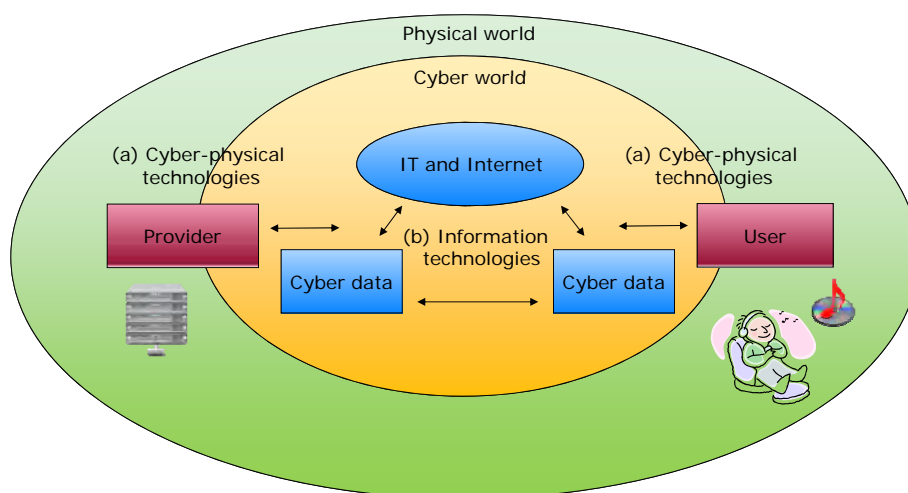
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## The point

- ❖ 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.

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## Updated PACT cyber-physical system model



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## New area other than existent 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 canalization including deep leaning.
  - For example, to provide automatic content arrangement service.

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## Study items of Study Session10

- ❖ 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

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## 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