



未来媒体网络协同创新中心
Cooperative Medianet Innovation Center



Future Media Network in the 5G Era



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Outline

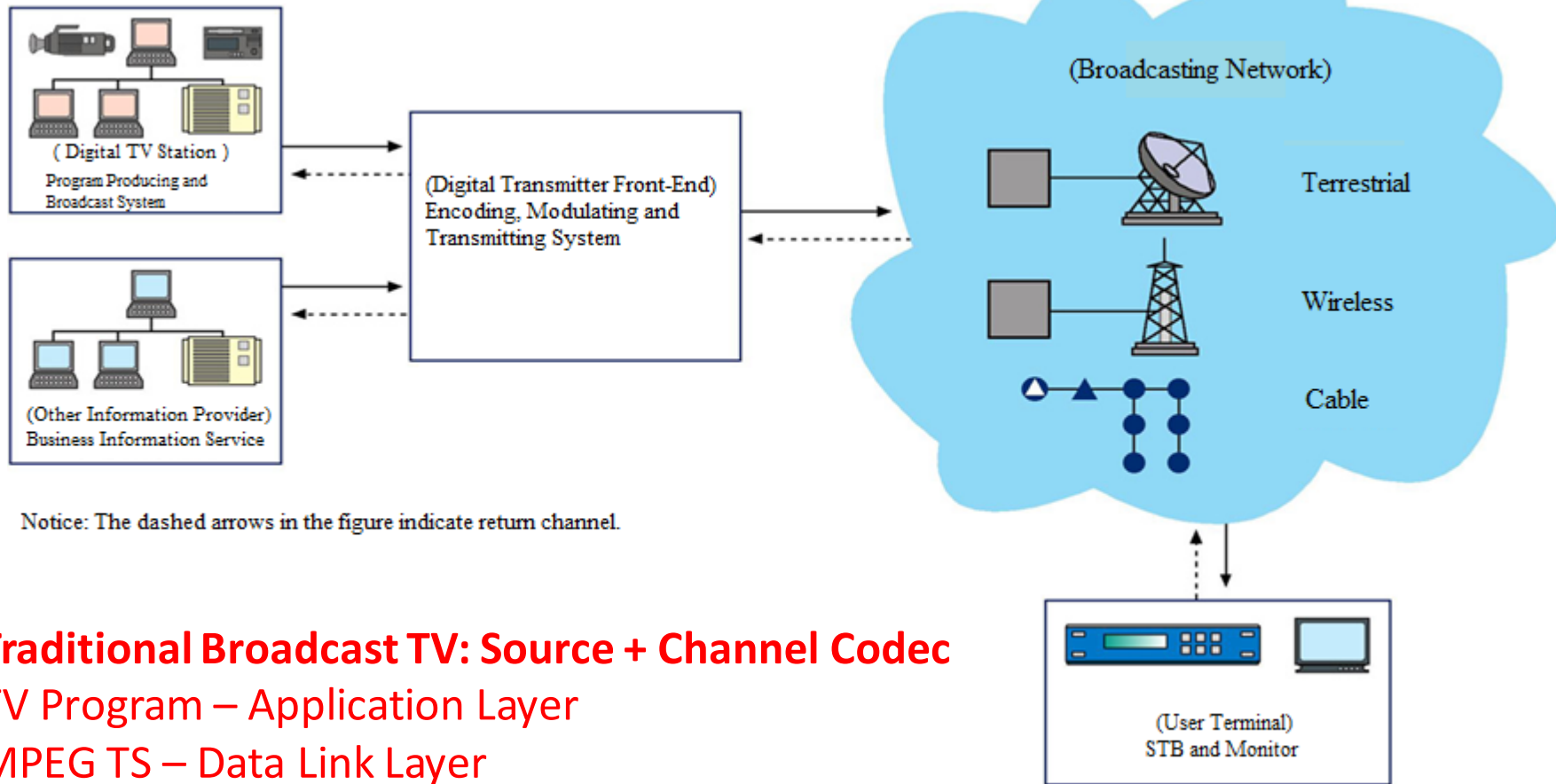
- **From TV Broadcast to Media Network**
- Media Network in the 5G Era
- CMIC and Some Recent Achievements
- Summary



Traditional Broadcast System

Service : TV Program

Transmission : Broadcast TV Network



Notice: The dashed arrows in the figure indicate return channel.

Traditional Broadcast TV: Source + Channel Codec

TV Program – Application Layer

MPEG TS – Data Link Layer

DVB/ATSC/ISDB/DTMB – Physical Layer

Presentation : TV Terminal



Evolution of Broadcast Television

More Ways to Consume Content

- More platforms: computers, tablets, phones, and etc.
- More ways: Fixed Internet, 3G/LTE, Wi-Fi, and

More Ways to Deliver Content

- Increase of the hit ratio of popular contents
- Repeated/redundant unicast content delivery

More Ways to Enrich Content

- Multiple sources contributed to single content
- User, Location, Device, Delivery Channel, and etc.



Evolution of Broadcast Television

Broadcast Television evolves into

Future Media Network

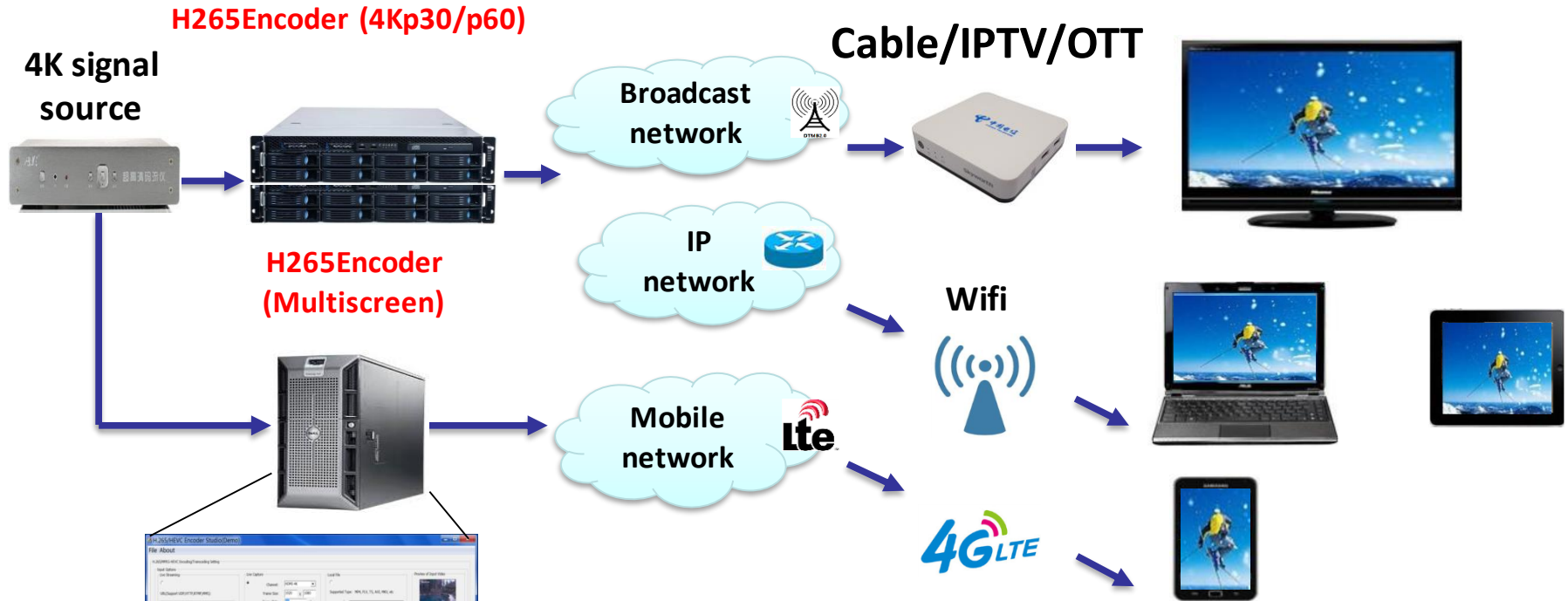
Higher Resolution

Better Experience

Flexible Transmission



Higher Resolution: UHDTV Coding Scheme for All Networks

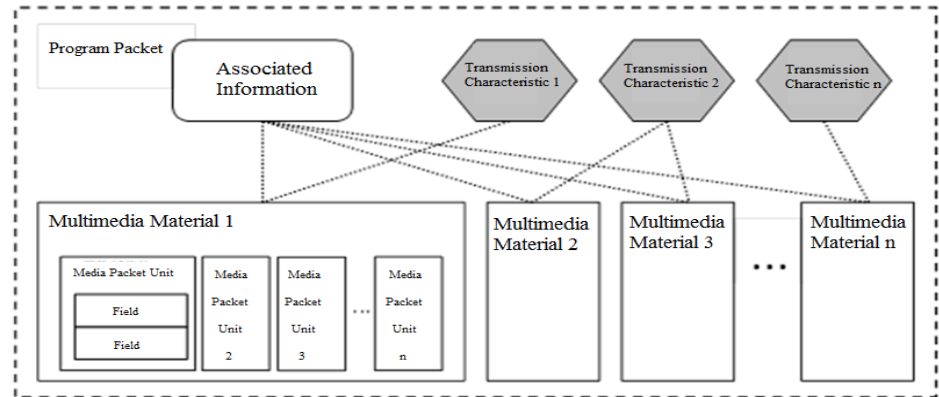


- Universal calculation platform
- Supports single-node and multi-CPU parallel
- Supports parallel CPU+GPU heterogeneous platforms
- Supports multi-node-distributed parallel, etc.

Real-time coding and multi-screen transcoding in ultra high definition video

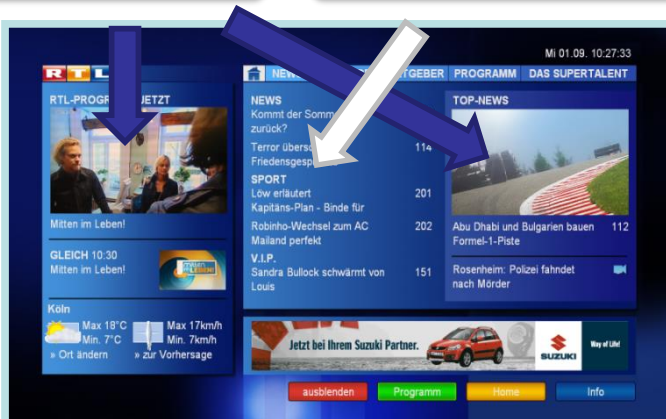


Better Experience: Uniform Data Encapsulation and Transport Protocol



Video and audio

Picture and text information



- Intelligent encapsulation unit
- Dynamic correlation in media material
- Dynamic space-time arrangement
- Relevance index based on file object model

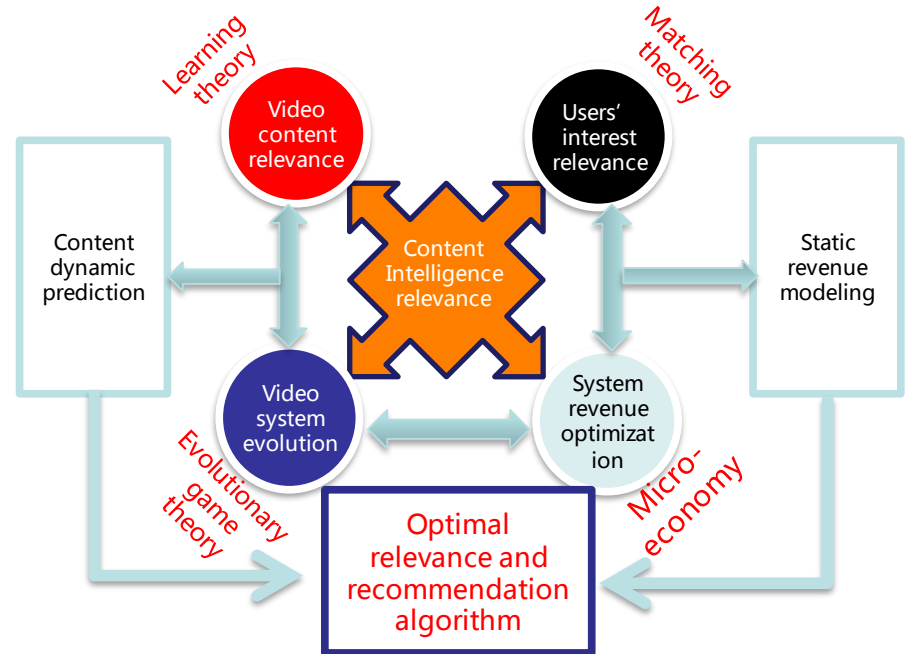
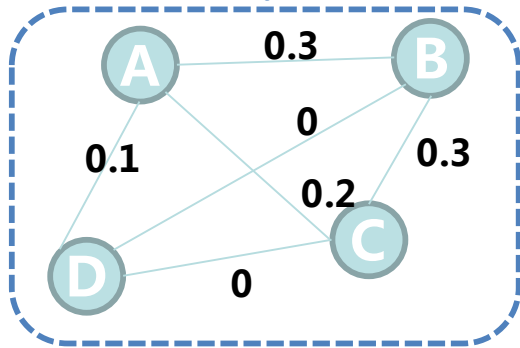
**Uniform data encapsulation, Break TS Limitation
Suitable for hybrid network transmission**



Better Experience: Uniform SMT Coupling Transport Protocol



Content-related calculation engine

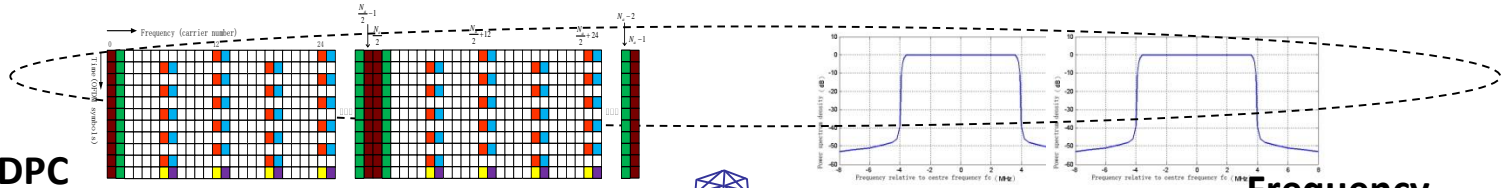


- Content-coupling similarity model
- System evolution model
- Revenue optimization model

Deeply mining media consumption impact
Combining the user experience with economic benefits



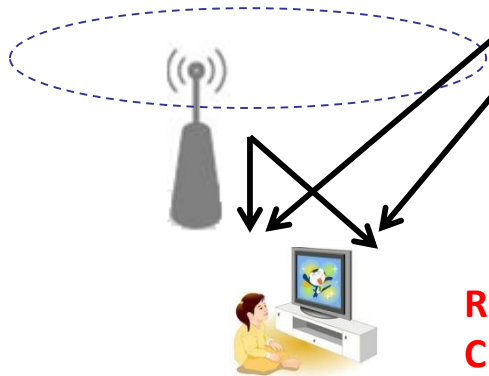
Flexible Transmission: New Broadcast Transmission Technology



OFDM + LDPC

Distributed MIMO

Distributed MIMO design supports local service insertion



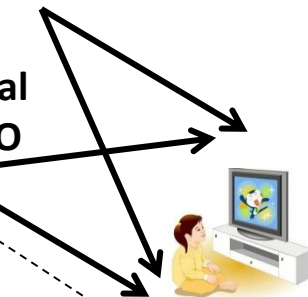
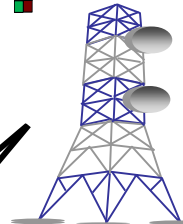
The frame structure support regularly insertion of real-time pipeline with preamble design

**RF Return Channel
Uplink channel design**



Unique code protection for signaling

Central MIMO

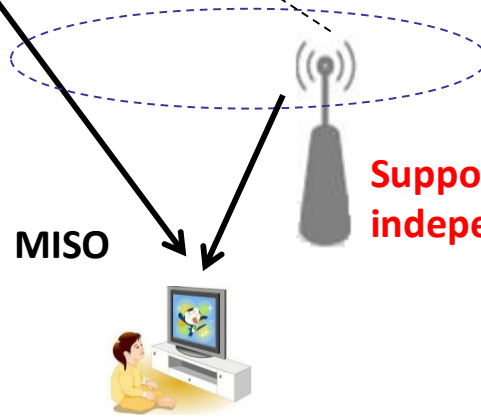


Frequency Aggregation

Frequency aggregation to support flexible use of spectrum

Support up to 75Mbps

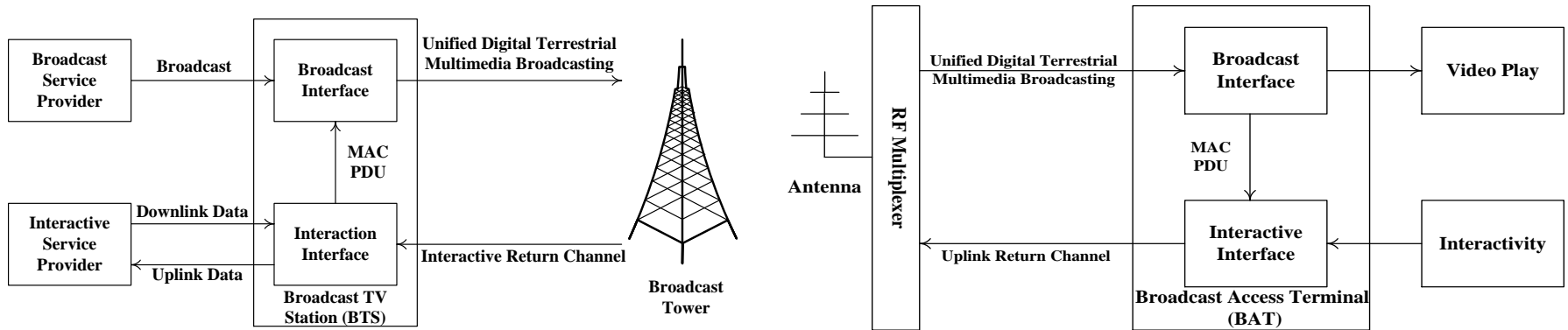
MISO



Support up to 256 independent pipelines



Flexible Transmission: Independent Return Channel



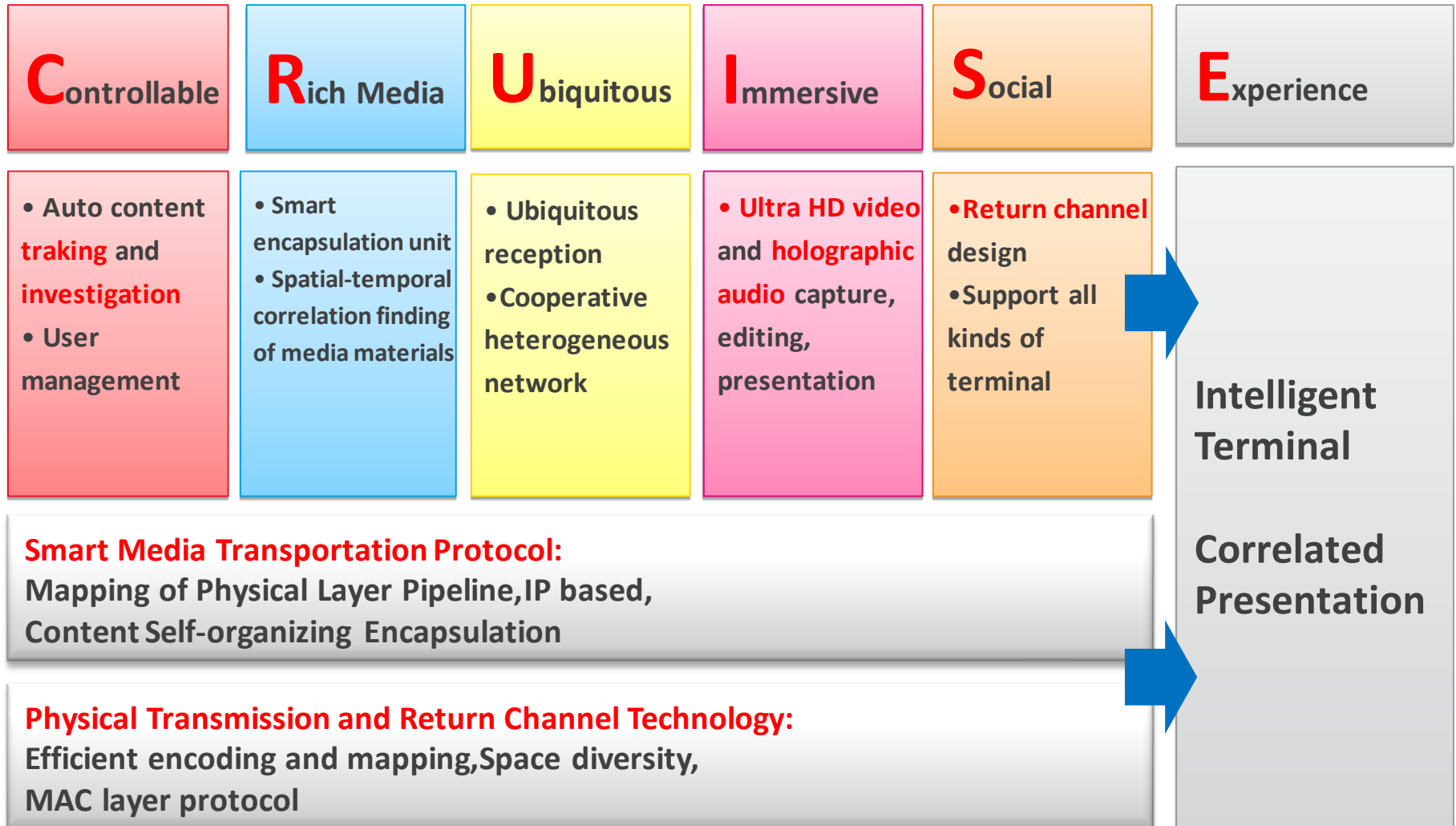
- Interactivity between users and service providers
- Uplink return solutions with flexible allocation
- Independent from any other networks



**Supports the dual structure of urban and rural
Suitable for the application in developing countries**



Characteristics of Future Media Network





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Comparison of the Two Networks

5G Network

Future Media Network

Common Belief :

End-to-end **ecosystem**, value creation towards **customers and partners**

Common Design Methodology :

Cross-layer design under the guidance of demand (service、 application)

Started from Physical layer, MAC layer

- System spectrum efficiency
- System capacity
- Multi user access mode
- Link delay
- Operator investment costs

Started from AV Content, Application layer

- Content Generation
- Source encoding
- Single user's transmission spectrum efficiency
- Operator security

Further expand the speed and scope

- User capacity and transmission speed
- Broadcast, access network and IoT, ...

Further optimize the network and content

- Network to perceive content
- Content to adapt network



Architecture of Future Media Network

Future Media Network

Unified Interface for
Multimedia Application

Smart Transport Protocol

IP Layer

Broadcast
downlink

Bi-directional
physical layer

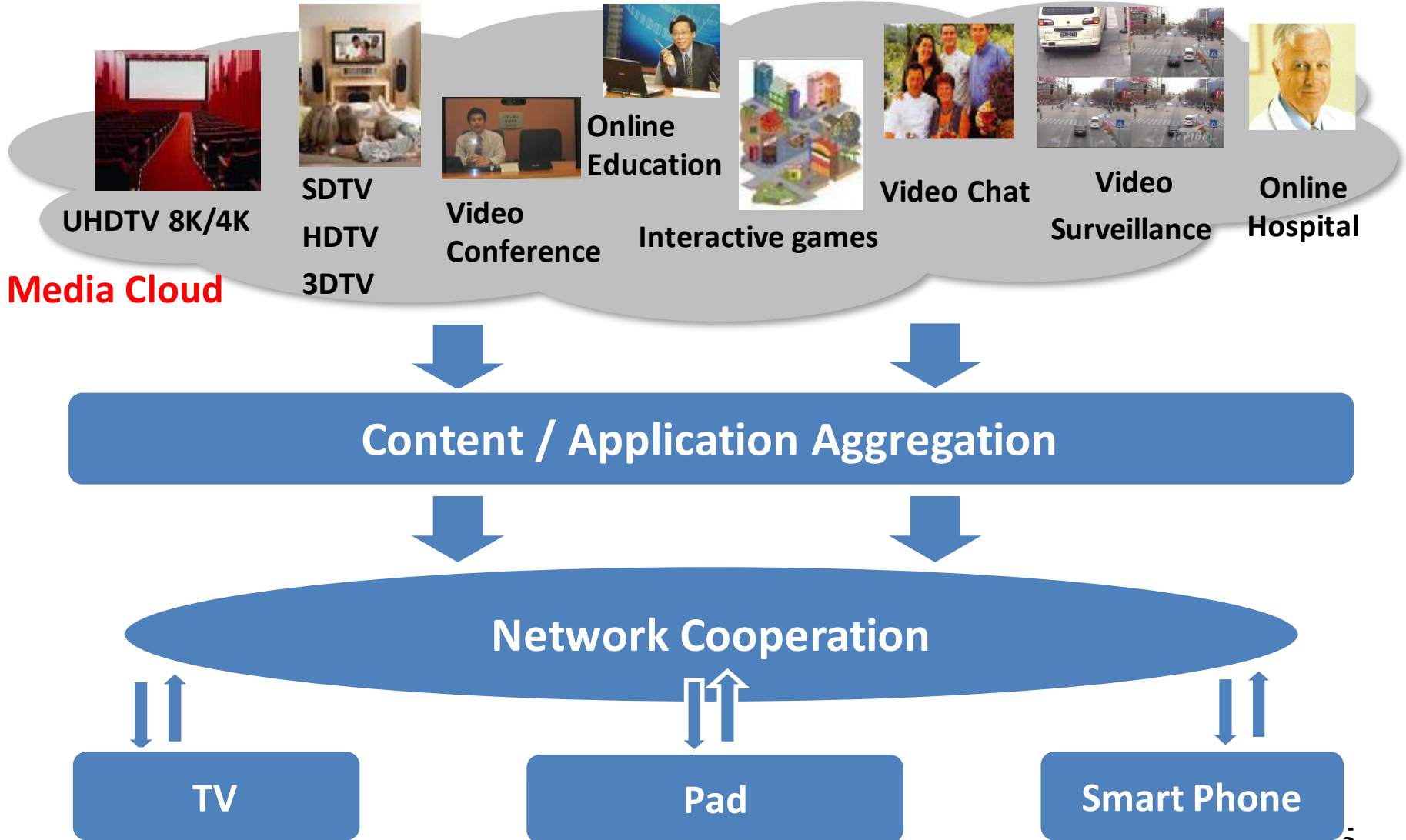


Features

- Efficient and flexible spectrum Utilization
- Network Interoperability
- Content labeling and clustering
- Immersive Audio/Video
- Mobile and Portable Service

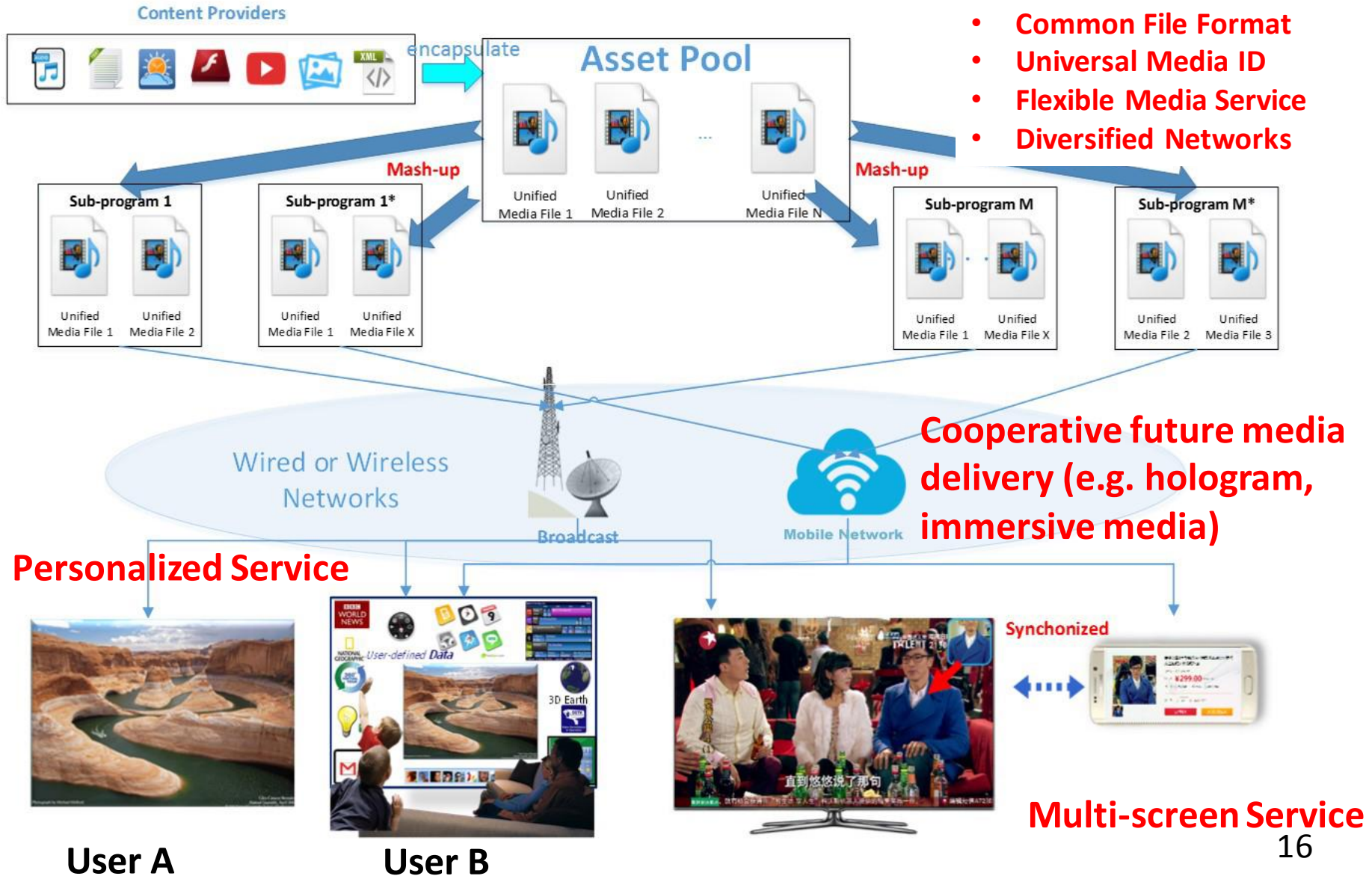


Unified Interface of Multimedia Applications



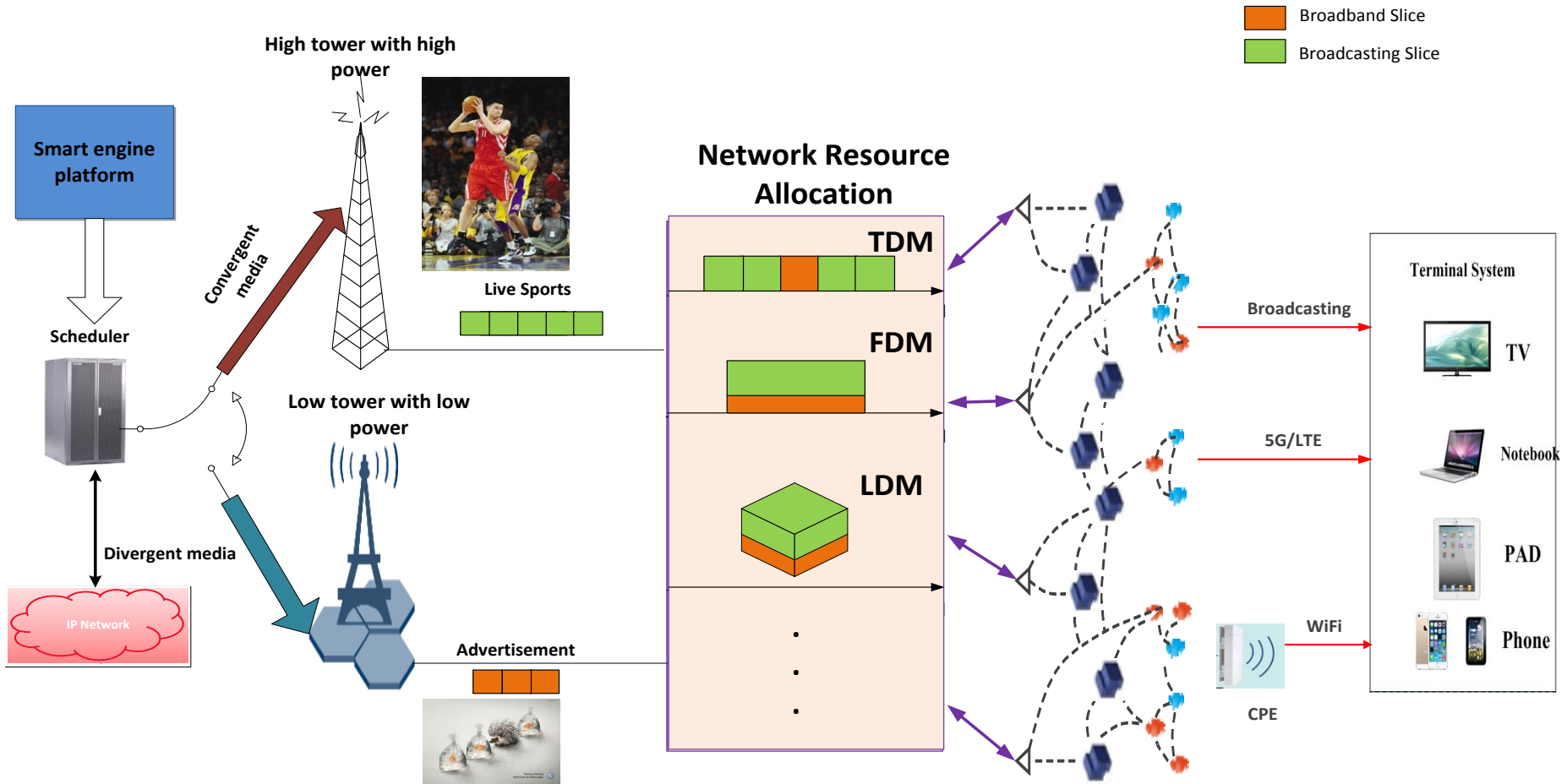


Unified Media Encapsulation





Cooperative Usage of Interoperable Network





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Joint Contribution to Chinese DTV Industry

9th PLAN



50th Anniversary
HDTV Live Broadcast



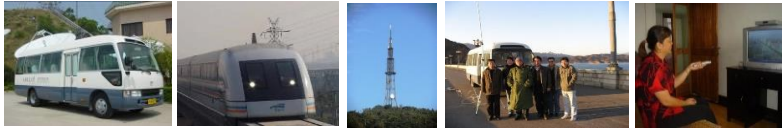
1st Generation of HDTV System
Lead 12 Research Institutes

10th PLAN

DTMB CMMB ABS-S ITU-R



1st Generation of Chinese Standards
Beijing Olympic and National Deployments



Organize Standard Research Proponents
20+ Provincial System Implementation and Tests
200+ Cities Trials and Commercialization

11th PLAN

12th PLAN



MOST and SARFT Next Generation Project
2020' s Analog Switch Off



Lead 15+ Research Institutes
Global Collaboration

13th PLAN



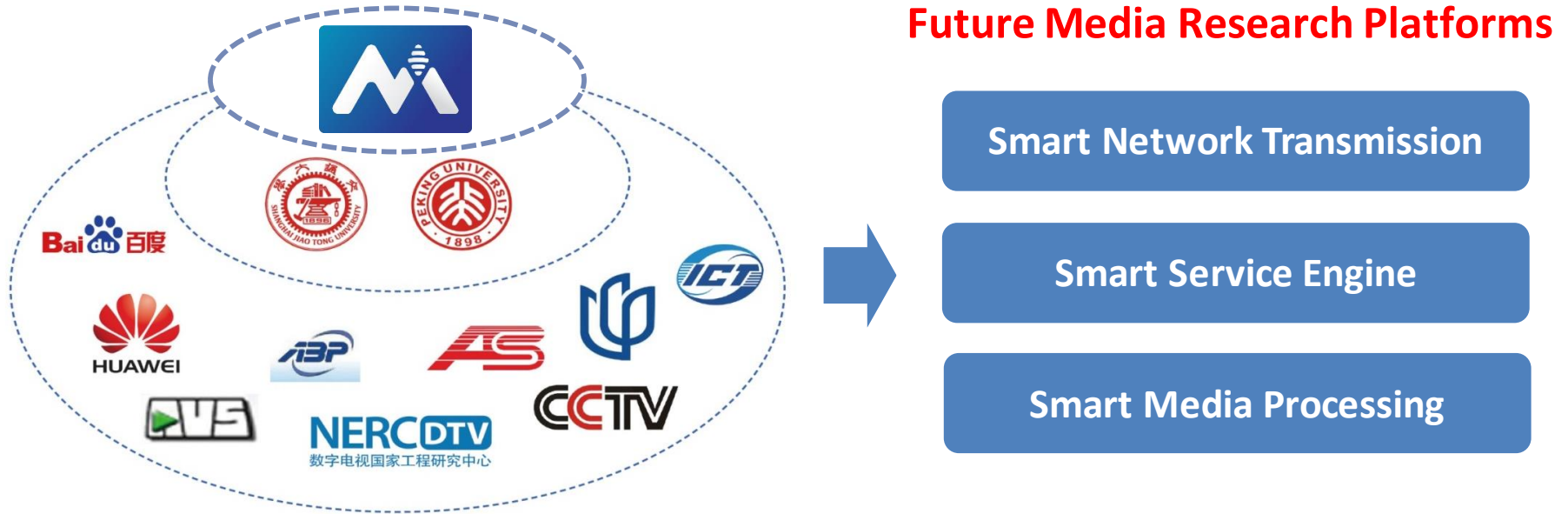
1996 - 2000

2001 - 2010

2011 - 2020



Cooperative Medianet Innovation Center



CMIC is founded by Ministry of Education to

- To develop the core digital media technologies
- To promote the industry development and deployment
- To train the digital media talents and specialists



China's First MIMO Broadcast Prototype

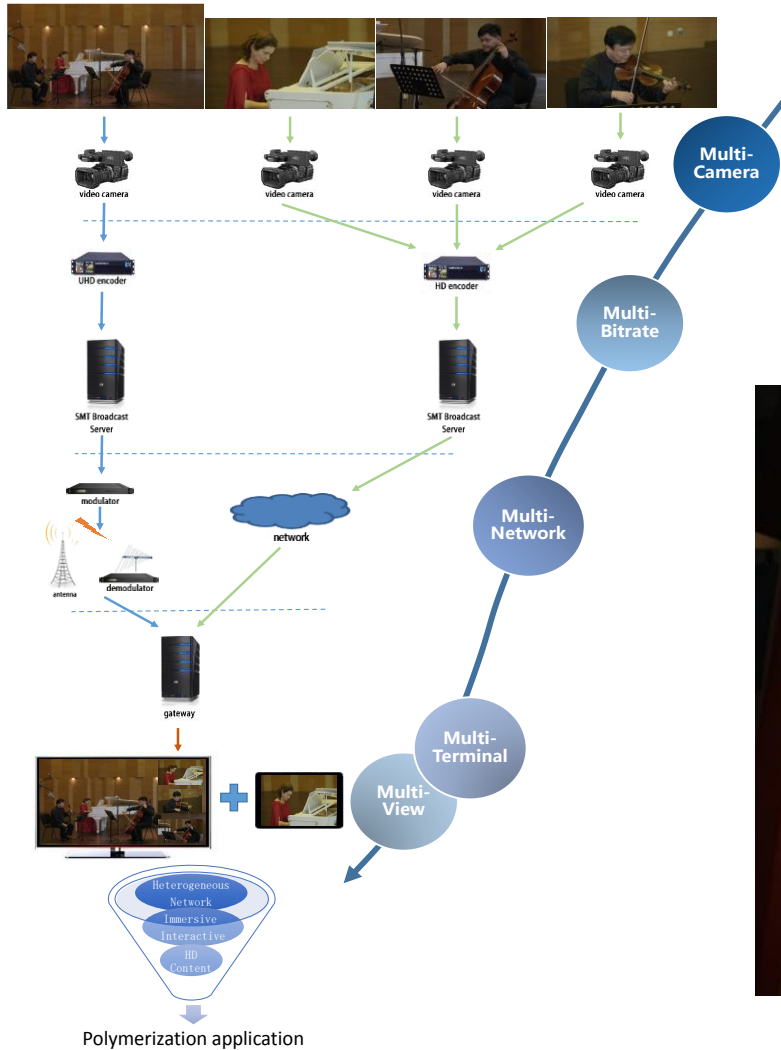


2*2 MIMO Broadcast System

- 60Mbps Fixed + 2Mbps Mobile Pipe @ 8MHz
- 2x4K UHD in Single Fixed Pipe
- Polarized MIMO



Smart Media Transportation Demo



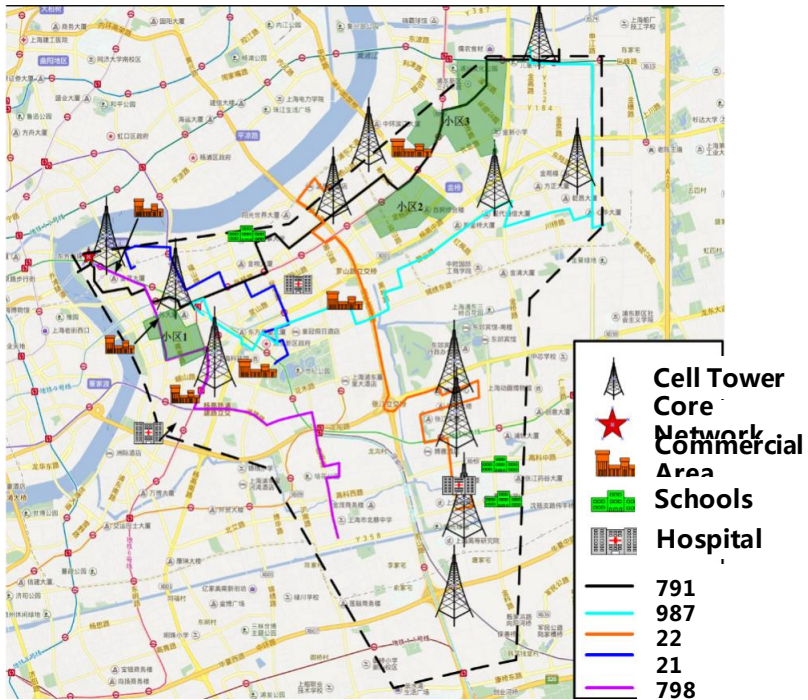
Features of SMT System

- Multi-Source
- Multi-Network
- Multi-Device
- Multi-View



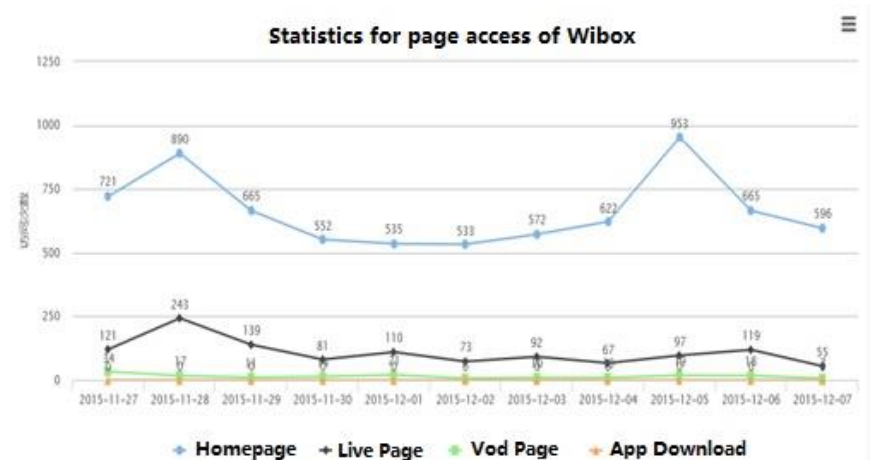


NGB-W Trail in Shanghai Since 09/2015



Shanghai Subway Node Unit Bidirectional Antenna

- 65 square kilometers in Shanghai
- 5 district, 5 Bus Lines, Metro Line 1
- >5 Broadcasting Tower (Power: 1000W)
- >20 Cell Tower (Power: 5W)
- >100 WiFi Nodes



Traffic peak at every Saturday



Summary

- The common goal of 5G and Future Media Network is to support massive high quality video service.
- Future Media Network can support rich media consumption by cooperating with multiple channels including 5G
- **Unified media encapsulation, unified protocol stack and converged transmission networking** will be the key technologies to collaborate with 5G.
- CMIC will strive for the technology research, standardization and industrialization of Future Media Network.



THANK YOU!