NERC DTV
National Engineering Research Center

3C Broadcast Television in China

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Ghent, June 19 2015

BMSB 2015

Outline

- Broadcast Television Status In China
- Vision of China's NGB-W System
- 3C Broadcast Television In the Future
- Summary

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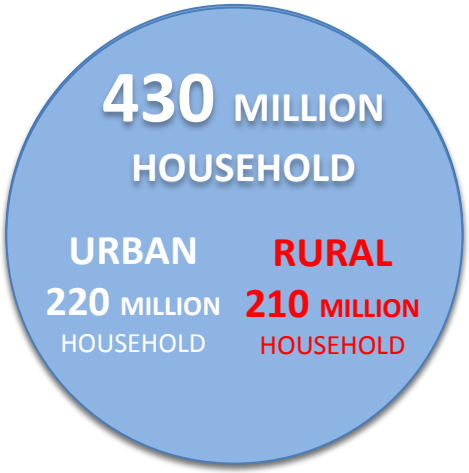
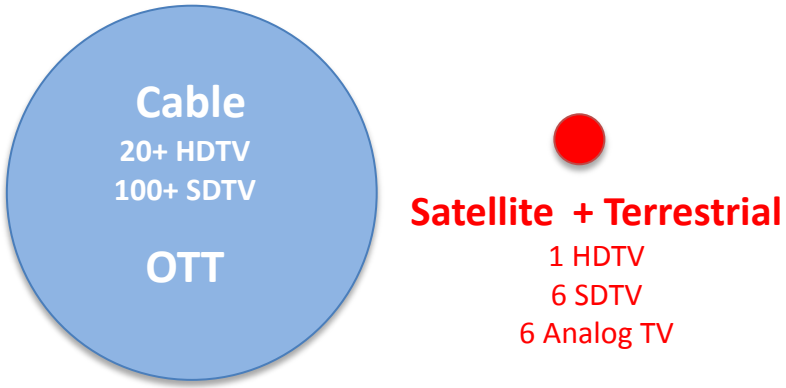
Dual Structure in China

TV Viewers in China



Inhabited with diverse geographical and economic conditions

Public Service Gap



Urban **Rural**

How to provide public service for 1.3 billion television viewers?

Trigger of Terrestrial Market

- **Satellite + Terrestrial**
  - Satellite: National and provincial programs, Encrypted
  - Terrestrial: Local programs, Free to air

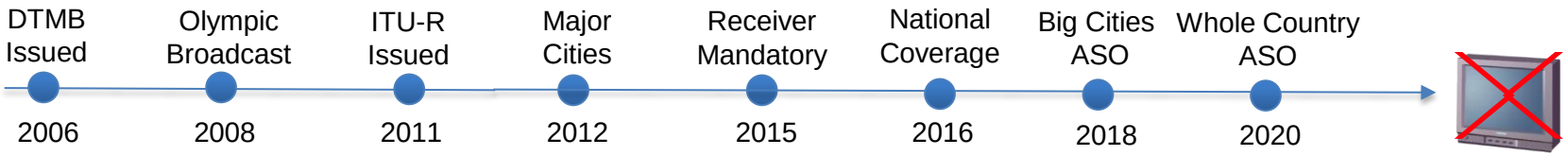
- **Encrypted Contents and Profitable Business**
  - TS Encryption and GPRS user authentication enable pay services
  - More local broadcasters benefit from the S+T services

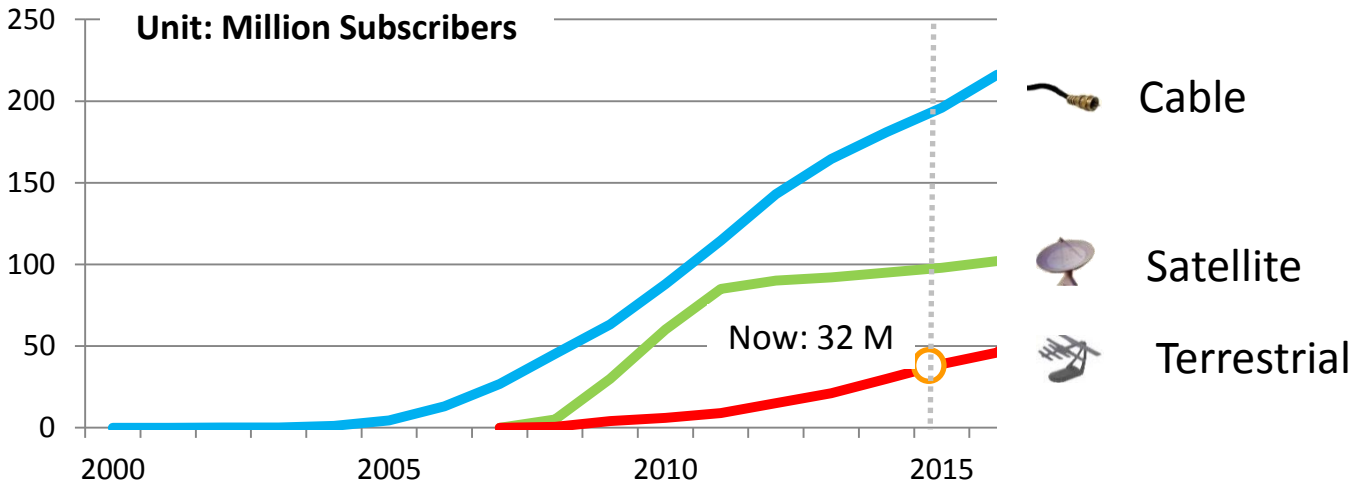
National Broadcast Coverage

- **2 Years' National Broadcast Coverage for ASO Preparation**
  - 800 million USD investment, from 2014.12 to 2016.12
  - 70% population, 2562 TV stations, 6293 transmitters
  - 12 CCTV programs + 3 Local TV programs

- **Terrestrial SFN Coverage**
  - Satellite distribution + Terrestrial coverage
  - 2 channels (1 provincial SFN, 1 city MFN)
  - DTMB, AVS+, Free to air

2020 Analog Switch Off Plan





* Data from CMIC Industry Research

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‘CRUISE’: Any Media, Networks, Users

- **Conclude use cases by joint work with FOBTV**
- Global Broadcasting Standard, Efficient and Flexible Spectrum Utilization, Network Interoperability, Bi-Directional, Communication Under Urban-Rural Dual Structure, Scene Representation: 3DTV,Multi-View, and Multi-Screen, UHDTV and Related New Functions, Immersive Audio, Mobile Reception, Target Advertising, Interactive Service and Personalization, Accessibility, Emergency Alerting

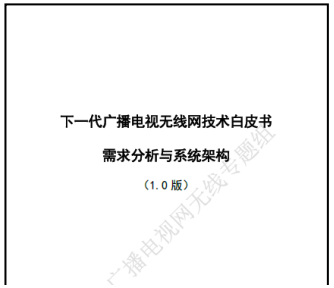
Broadcast + Internet

Controllable | **R**icher Media | **U**biquitous | **I**mmersive | **S**ocial | **E**xperience

How to do with ‘CRUISE’ standard ?

- **In 1st generation DTT standard, China only focuses on**
  - RF Transmission Standard (DTMB)
  - Video Codec Standard (AVS)
  - Audio Codec Standard (DRA)

- **In NGB-W, takes into account the whole protocol**
  - Broadcast Downlink
  - Uplink
  - Transport
  - Applications

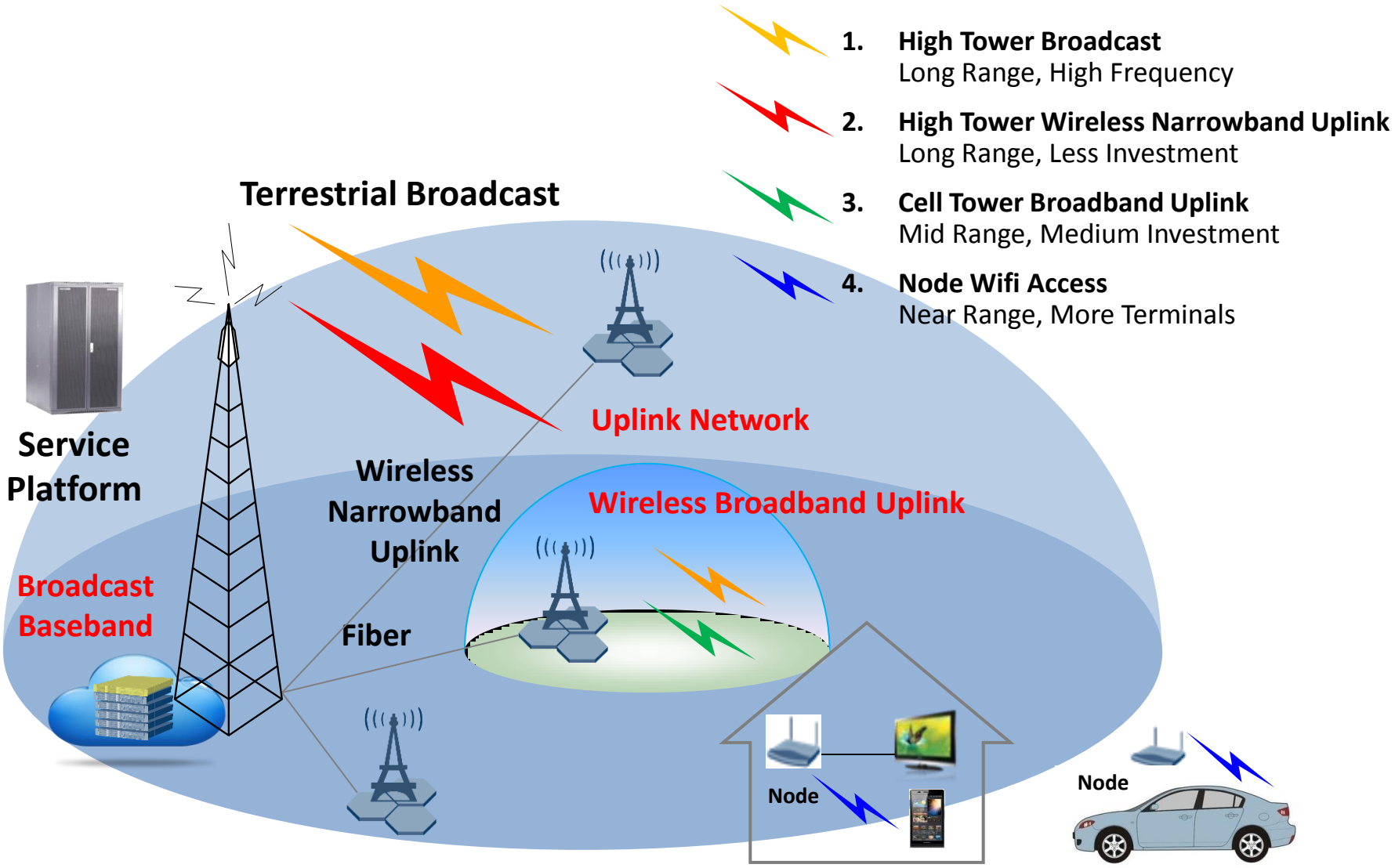


NGB-W System Architecture
NGB-W System Use Cases Analysis

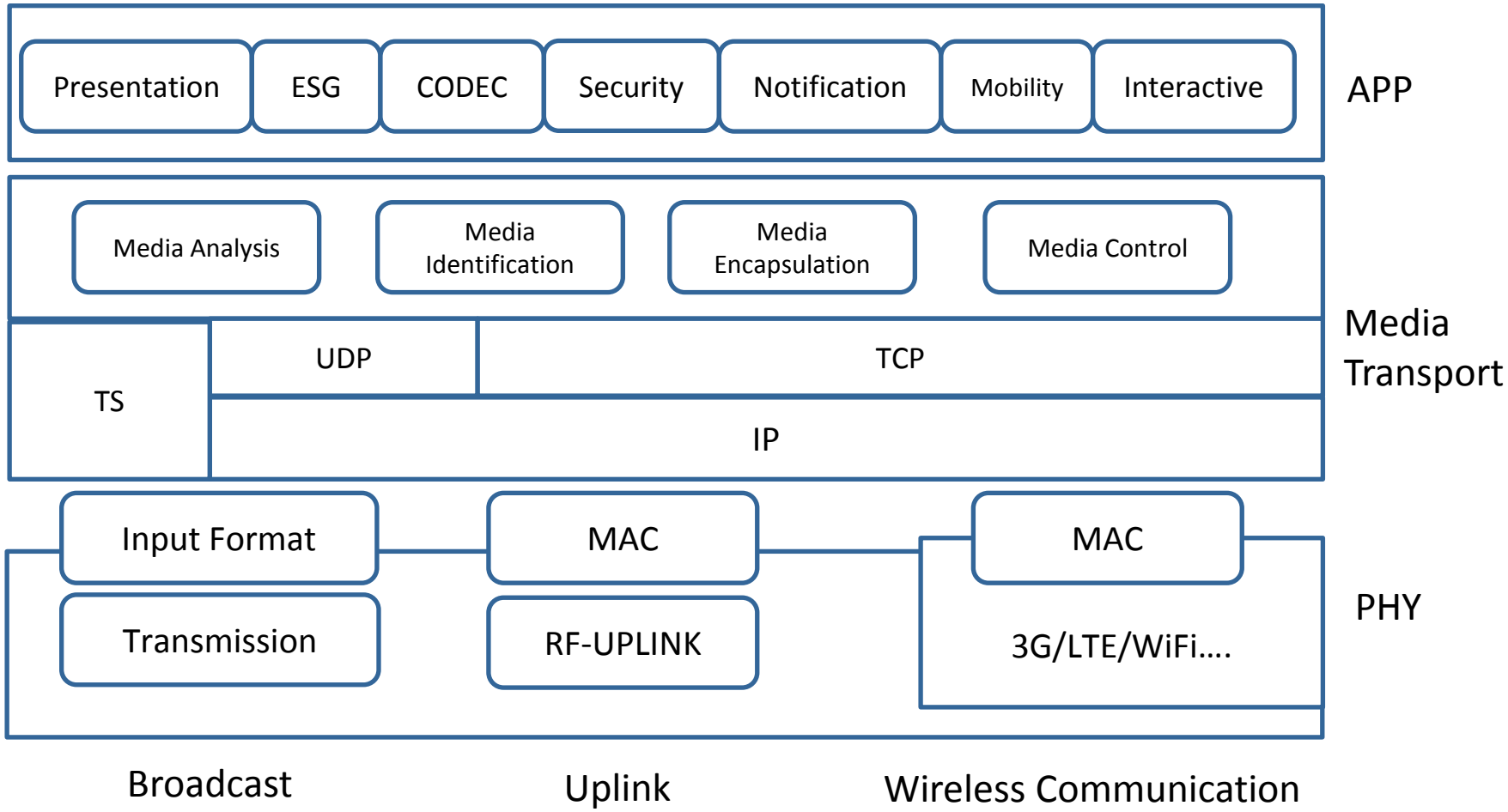
How to do with ‘CRUISE’ standard ?

- **Chinese Characteristics**
  - Strengthen public service: Support legacy TS
  - Looking ahead: IP based, mobile service and data service
  - Urban-Rural dual broadcast structure: SD, HD and UHD coexist
  - Security: CA and DRM coexist
  - 700MHz Issue: Likely provides broadband access by broadcasters
- **International Perspective**
  - Cooperation with SDOs and Initiative, including ATSC, DVB, FOBTV
  - Open Standard Technologies

Network Infrastructure



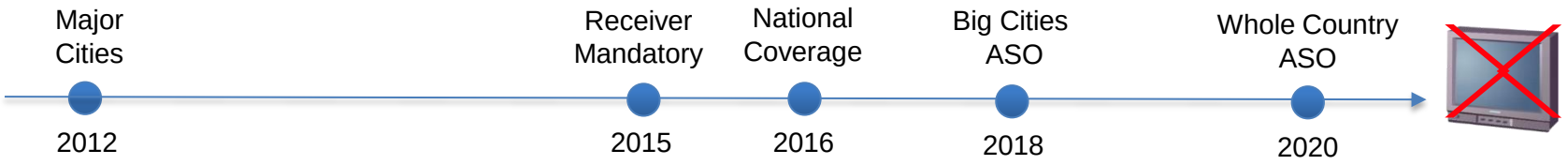
Protocol Layered Structure



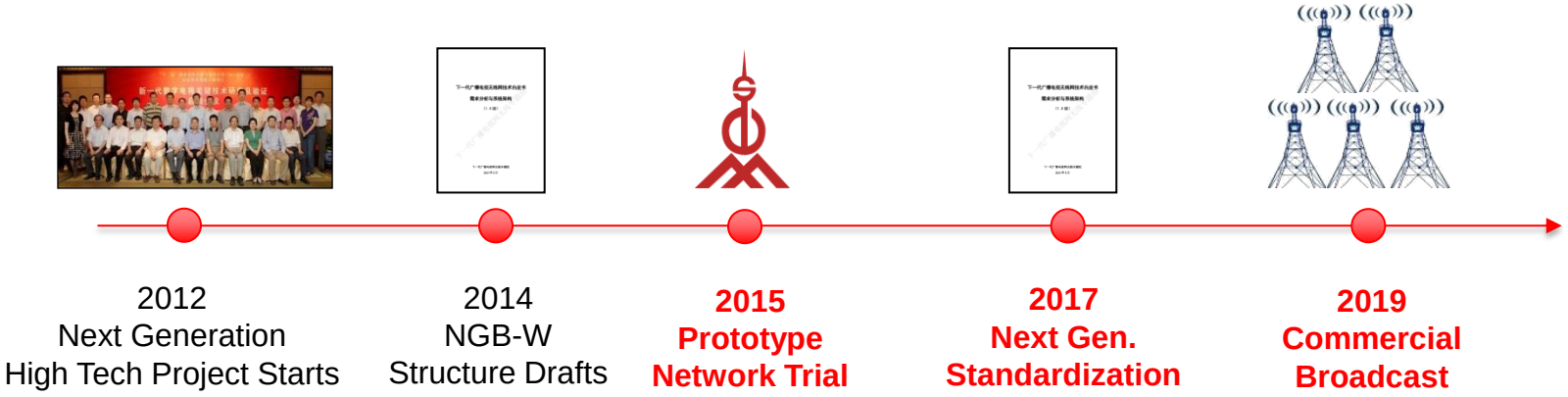
NGB-W Deployment Timeline

- **700MHz band will be fully kept to guarantee transition and new services**

1st Generation Broadcast System

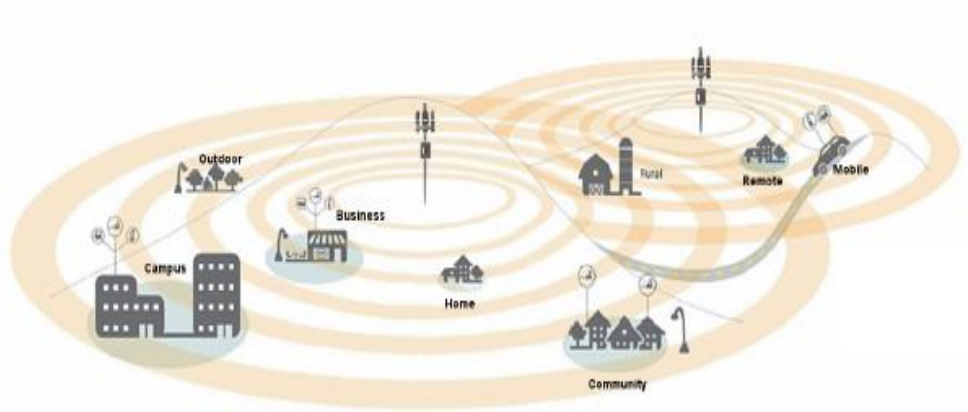


Next Generation Broadcast System



System Trial Platform in Shanghai

Next Generation Content Provider	Next Generation System Provider	Next Generation Network Construction and Operation
SMG BesTV	NERC DTV National Engineering Research Center	OCN
• 4K UHDTV Contents • Mobile TV Contents • Multi-Screen Contents • PGC/UGC Media Contents	• 4K Full Link Trans. System • Broadcast Downlink • Bidirectional Uplink • Smart Engine	• Transmission Construction • Networking Testing • Coverage Testing



- **> 10 Broadcast Towers**
- **> 1000 Bidirectional Base Stations**
- **> 10000 Wi-Fi Nodes**

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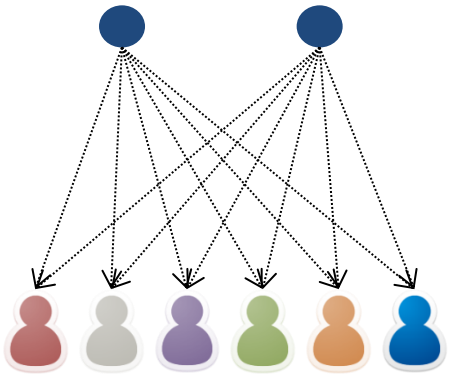
Future Trends of Broadcast TV

Phase 1: Broadcast

- Linear Content
- Broadcast Transmission
- Passive Reception

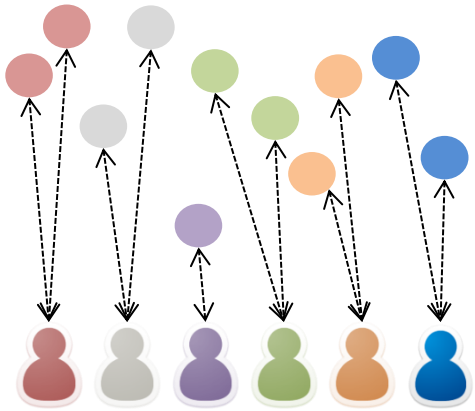
e.g. Traditional TV Channel



Phase 2: Interactive

- Fragmented Content
- Point to Point Connection
- Active Demand

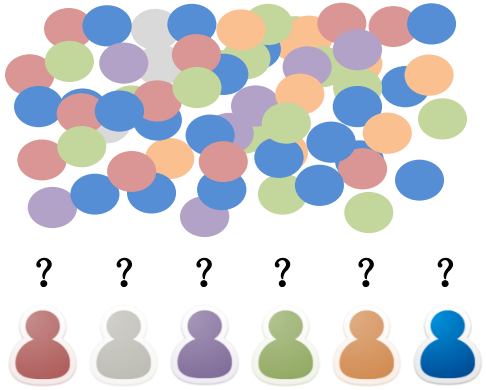
e.g. Streaming Video



Phase 3: 3C Broadcast

- Content Correlative Storage
- Cooperative Communication
- Computing Push and Pull

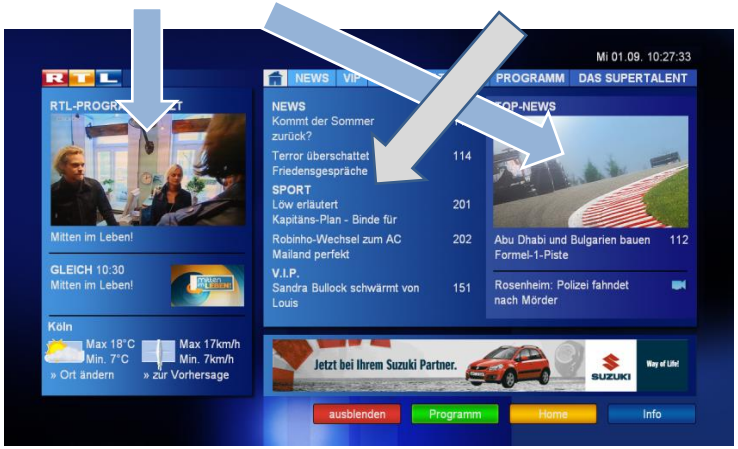
3C Network for Future Media

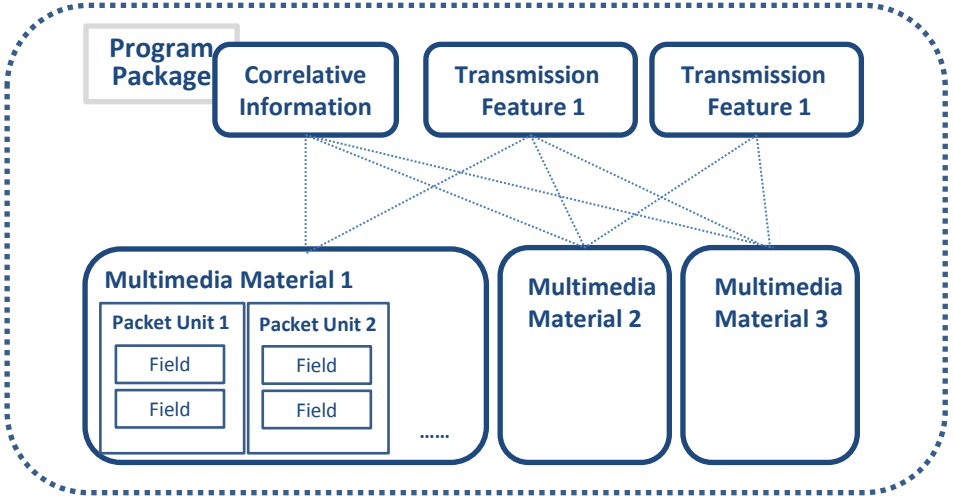


Correlative Storage

Video & Audio

Tele Text

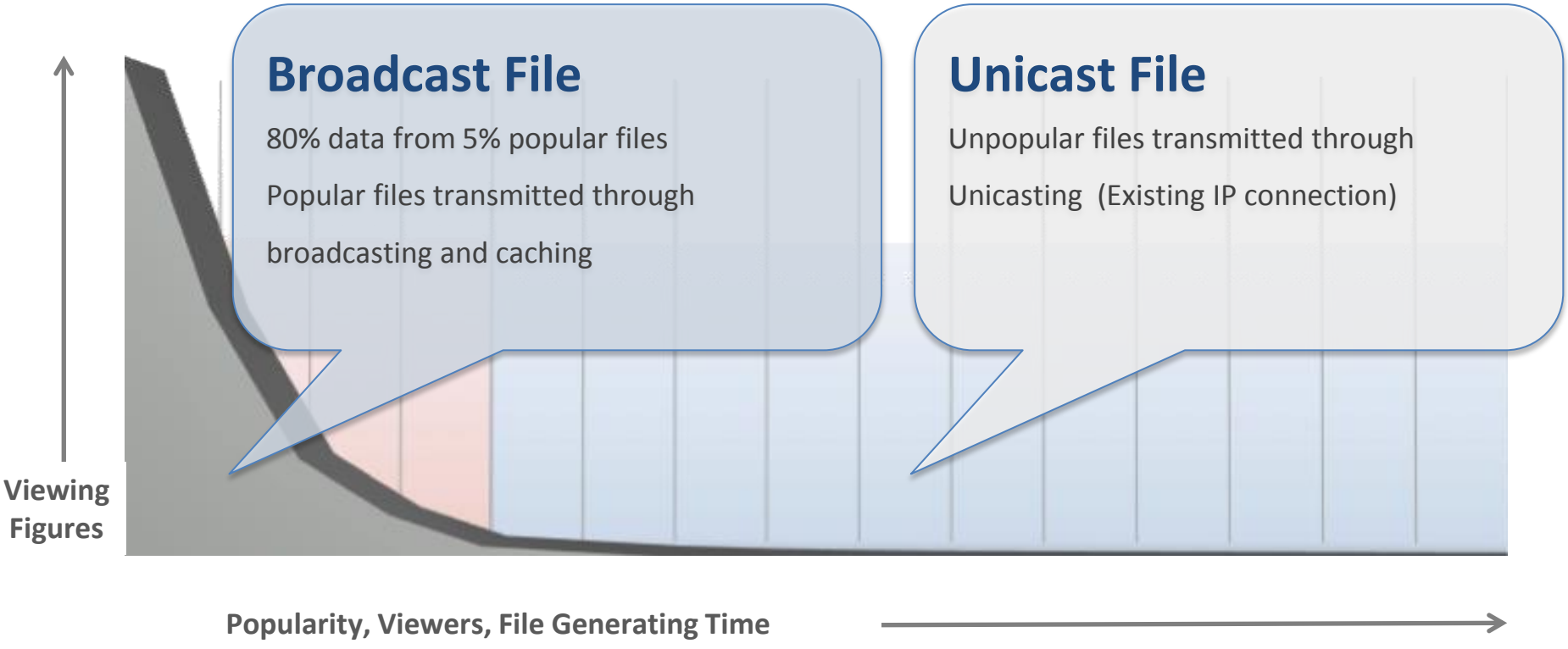




- **Smart Package Unit**
- **Dynamic Correlation Presentation**
- **Dynamic Time Distribution Presentation**
- **File Object Based Correlation Index**

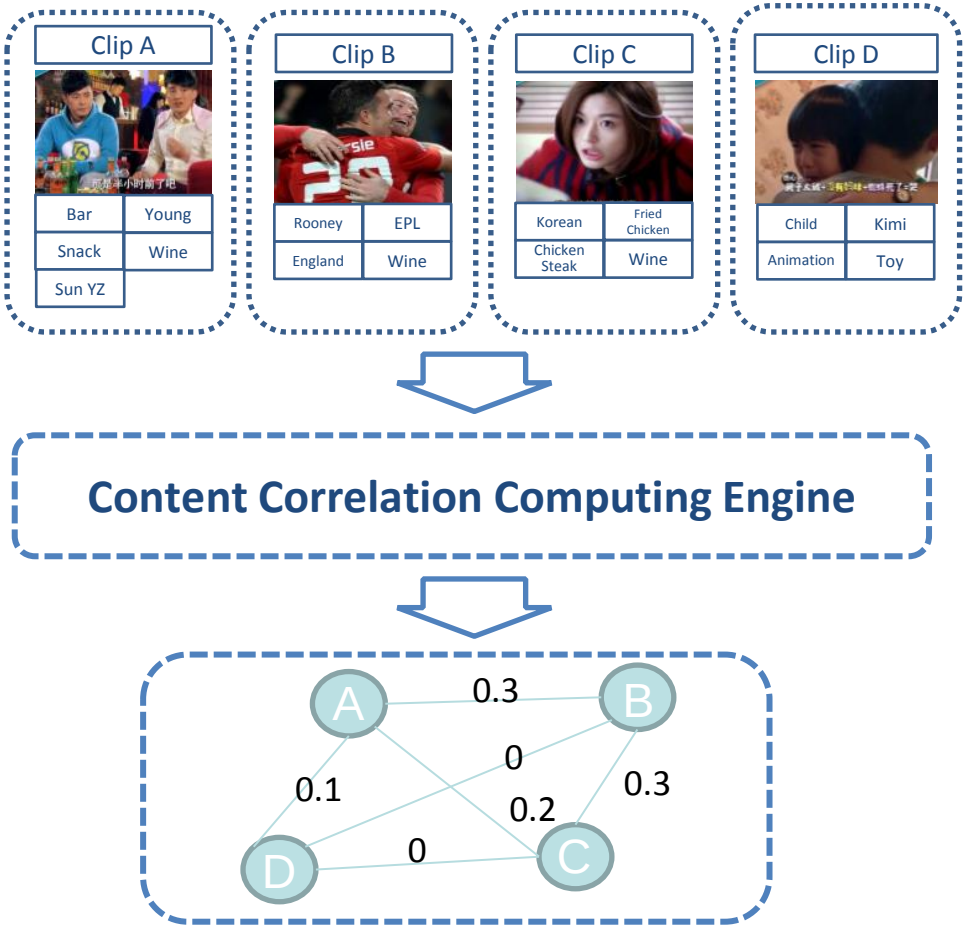
Unified Packaging Storage

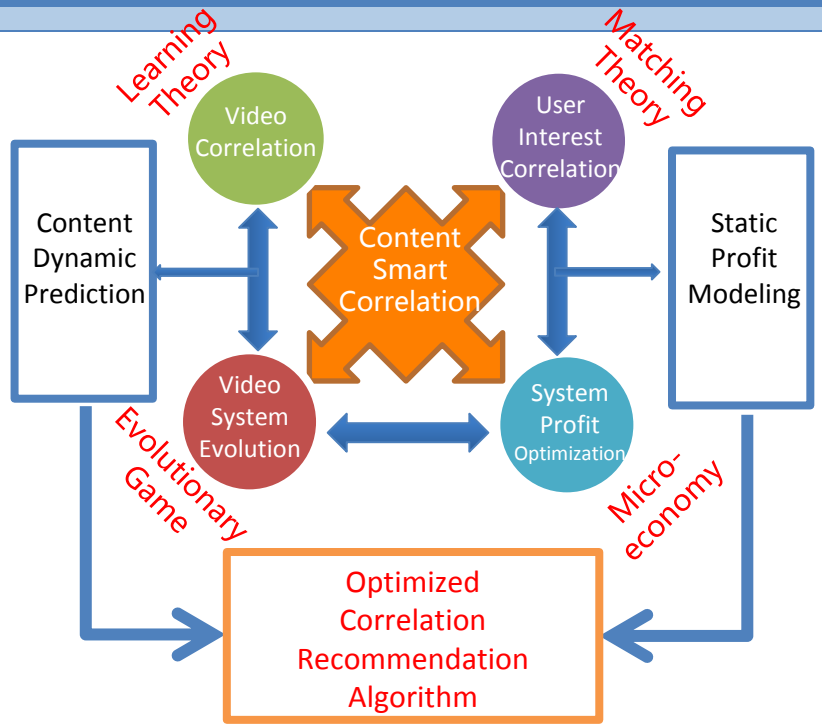
Cooperative Communication



- **Popular vs Unpopular Files**
- **Public Information vs Private Information**
- **Information Demands vs Information Mining**

Computing Presentation

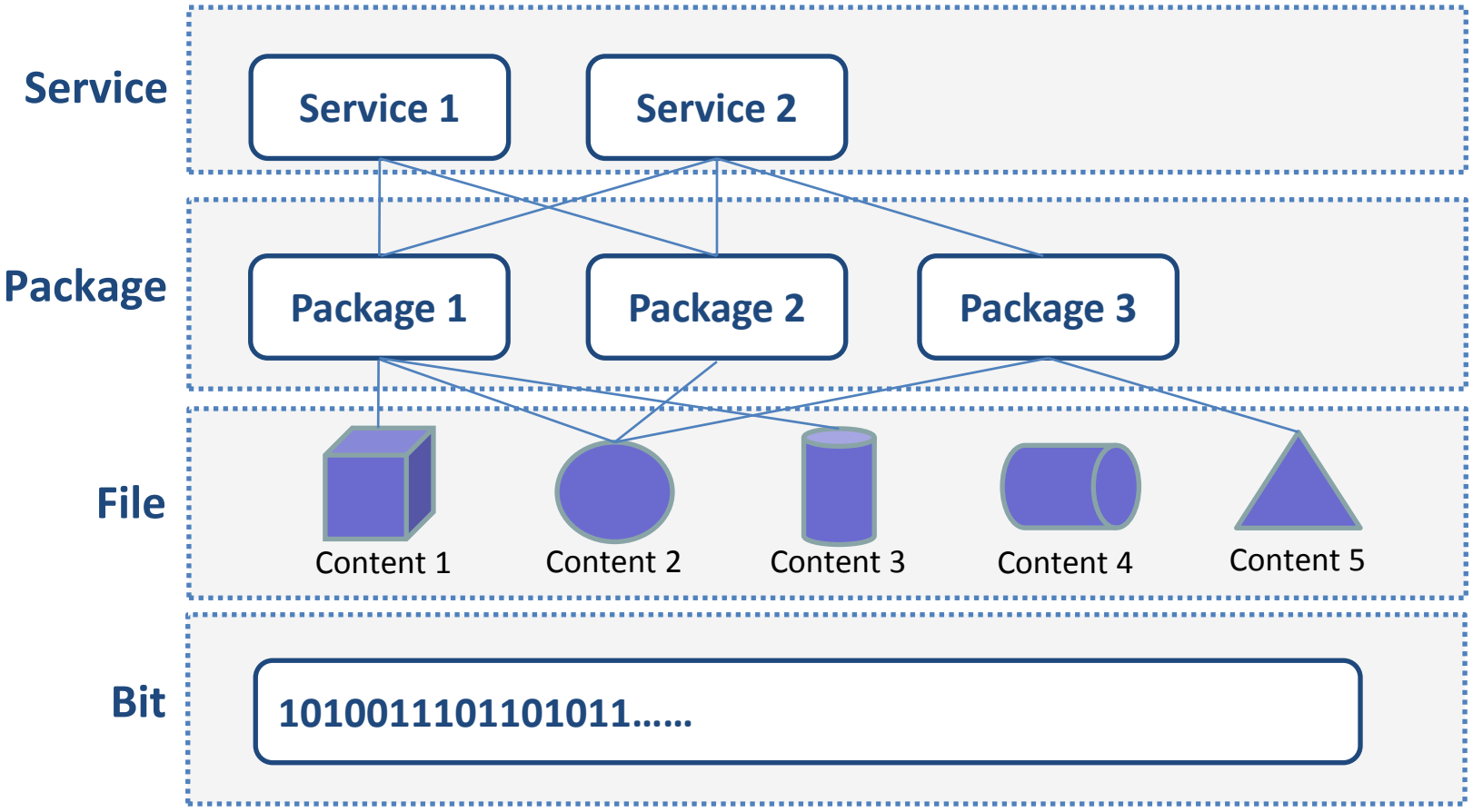




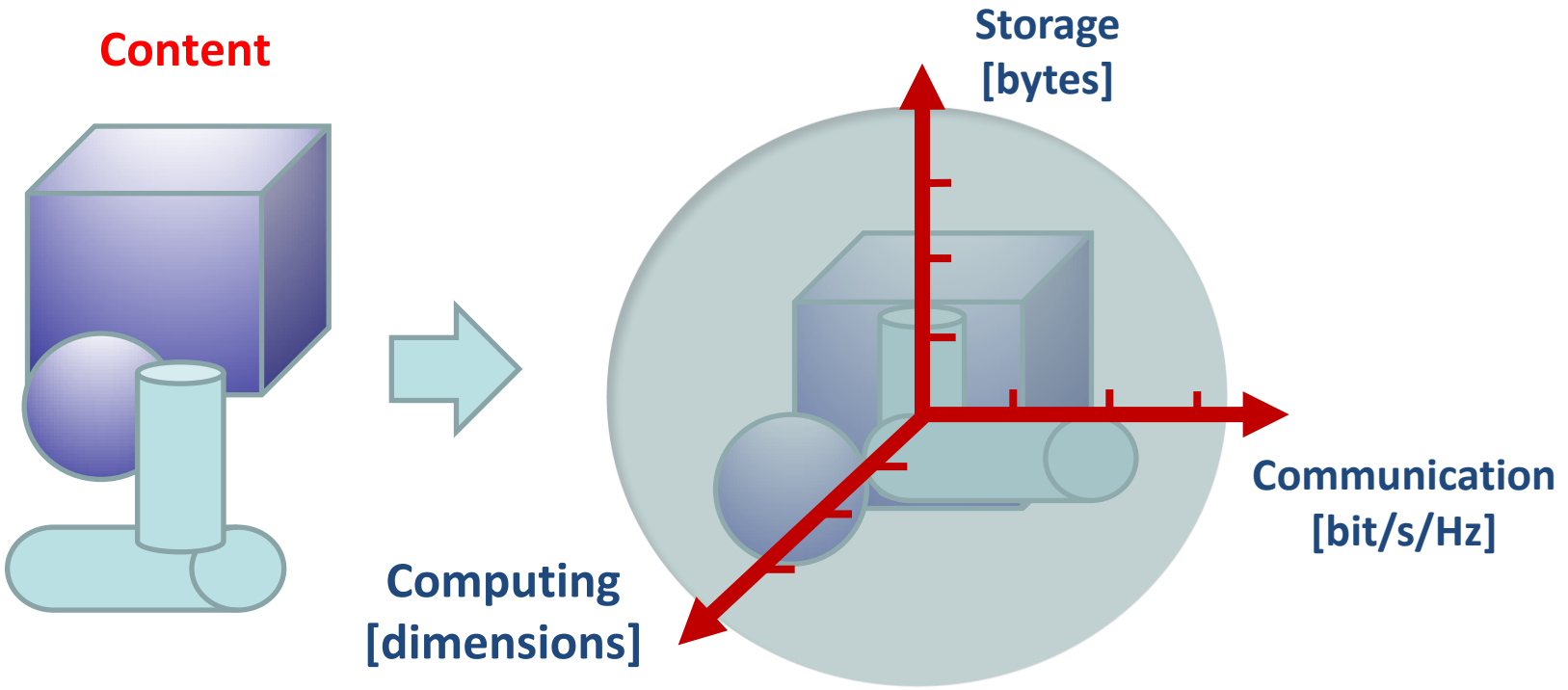
- **Content Coupling Similarity Model**
- **System Evolution Model**
- **Profit Optimization Model**

- **Deeply exploring and computing the factors affecting media consumption**
- **Promotes correlative presentation considering users experience and economic benefits**

Goals of 3C Network: Service Priority, Not Traffic

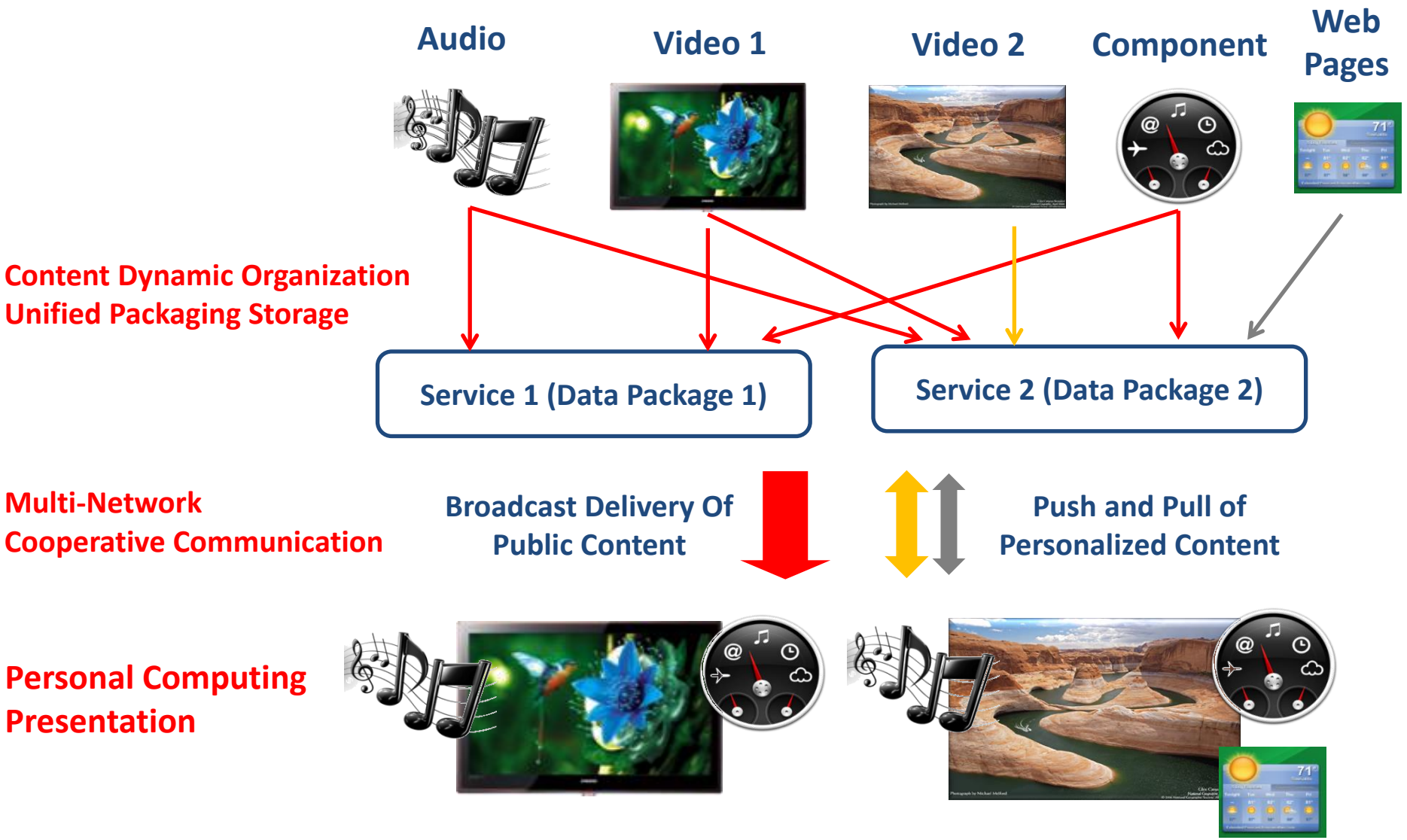


Basic Theory of 3C Network



- Shannon's Limit: Growth of communication capacity
- Moore's Law: Growth of computing and storage
- Rich computing and storage capacity → Multi-Network sustainable capacity growth
- How to define 3C scale?
- How to define 3C capability?

3C System Application in the Future



Summary

- Terrestrial broadcast is a key public culture infrastructure in China. With national investment and mandatory policy, the terrestrial deployment is accelerating.
- China will make its next generation standard after DVB and ATSC with some of its own characteristics. The design of the system and standard will leverage more open technologies and share IPs with international partners.
- How to build an efficient Correlative Storage, Cooperative Communication and Computing Presentation framework is important for futural broadcasting video services.

Thank you very much