Security Level:

Mobile Content Delivery: Challenges and Opportunities

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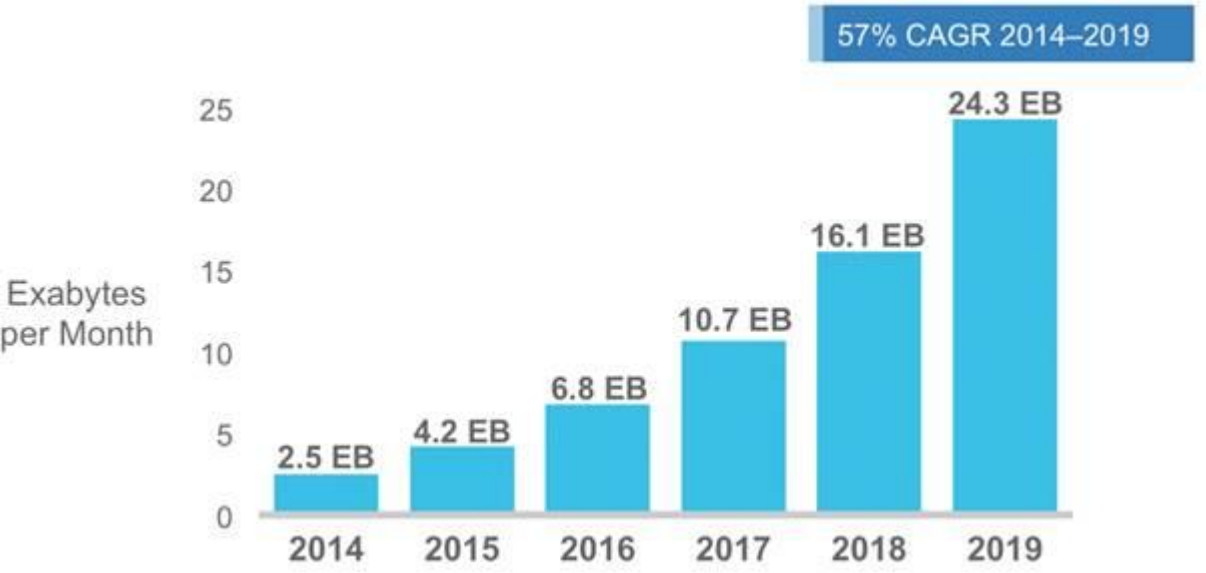
Main Content

- **Opportunities of Mobile Video**
- **Challenges of Mobile Video**
- **Thoughts on Mobile Content Delivery**

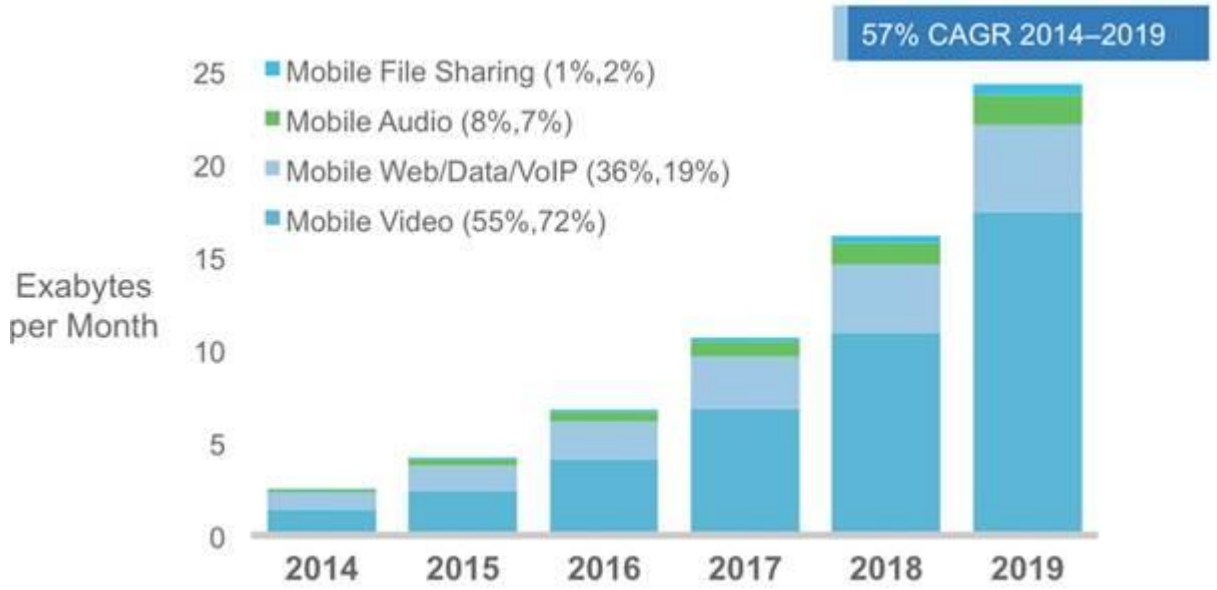
Mobile Traffic and Mobile Video

Source: http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.html



Cisco Forecasts 24.3 Exabytes per Month of Mobile Data Traffic by 2019

Source: CISCO



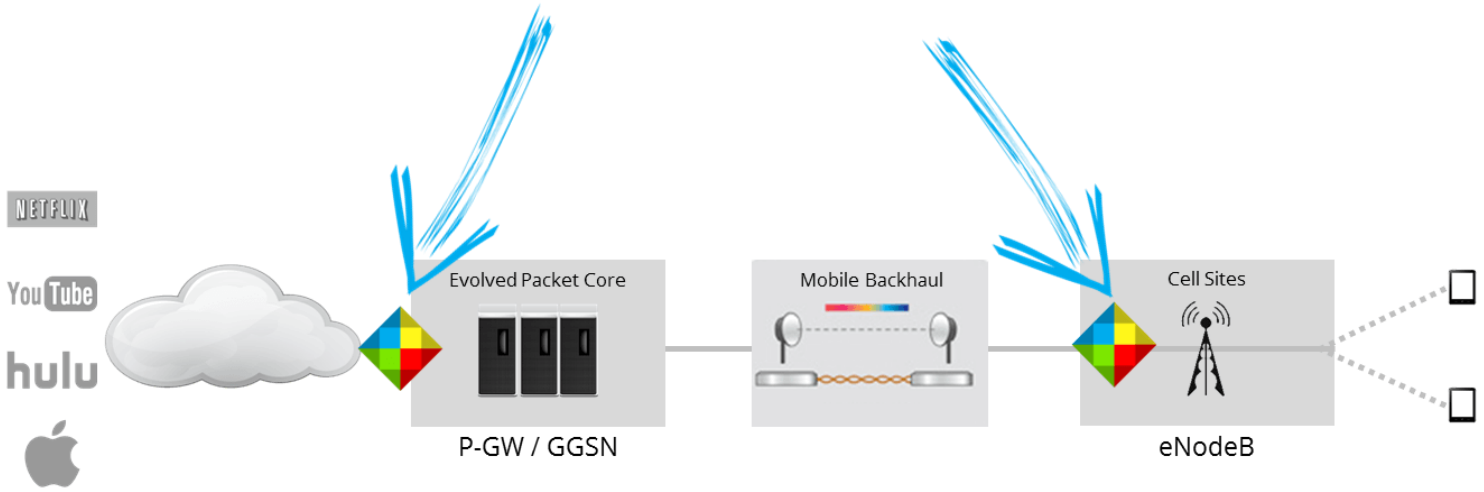
Mobile Video Will Generate More Than 69 Percent of Mobile Data Traffic by 2019

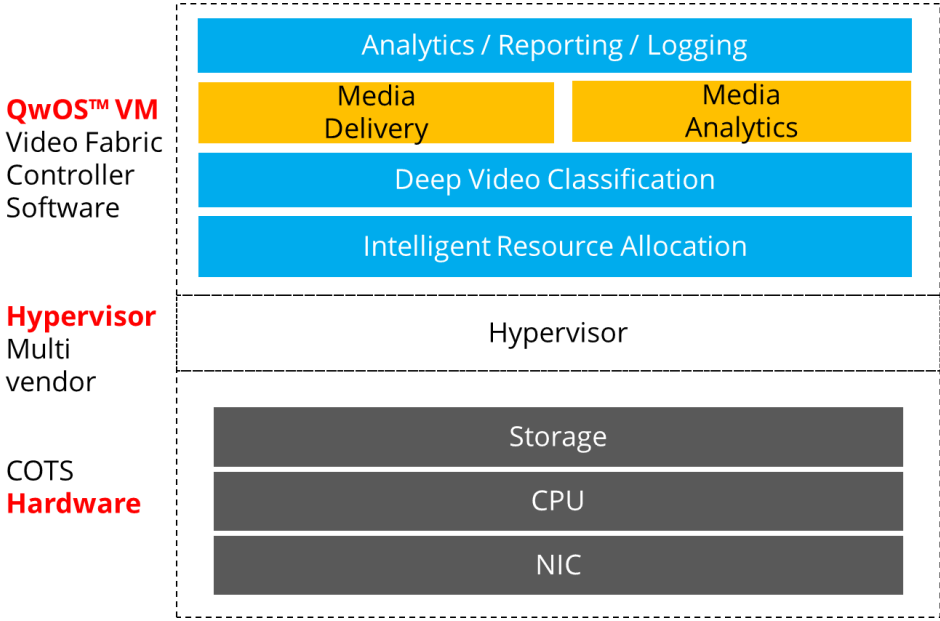
Source: CISCO

- Mobile Video Services make people's life more luxury;
- Mobile Video Services consume up a great number of bandwidth and transport resources, and vendors can sells more network devices to network operators or service providers;
- Operators stick its users through the video services , but operators try to free out more transmission bandwidth of the video in the Busy Time at the same time not degrading QoE with video optimization technologies;

NFV-based Mobile Video Optimization

Open Caching NFV Software Optimizes the Network for Video



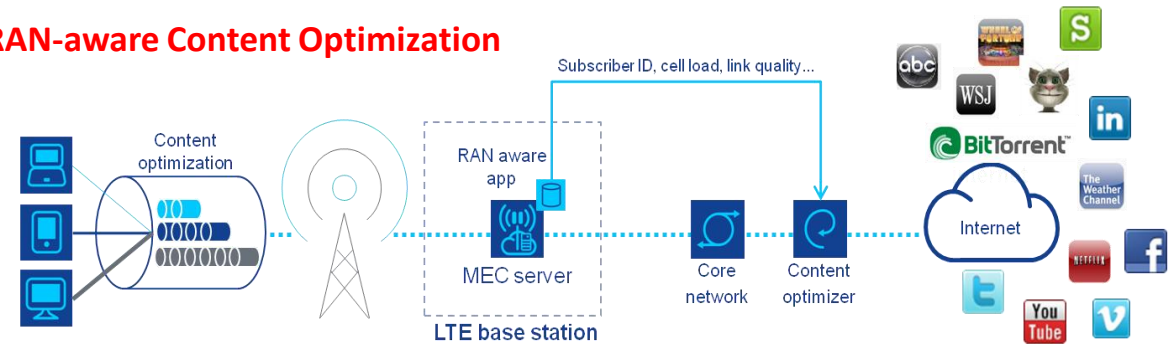


Source: http://qwilt.com/solutions/mobile/

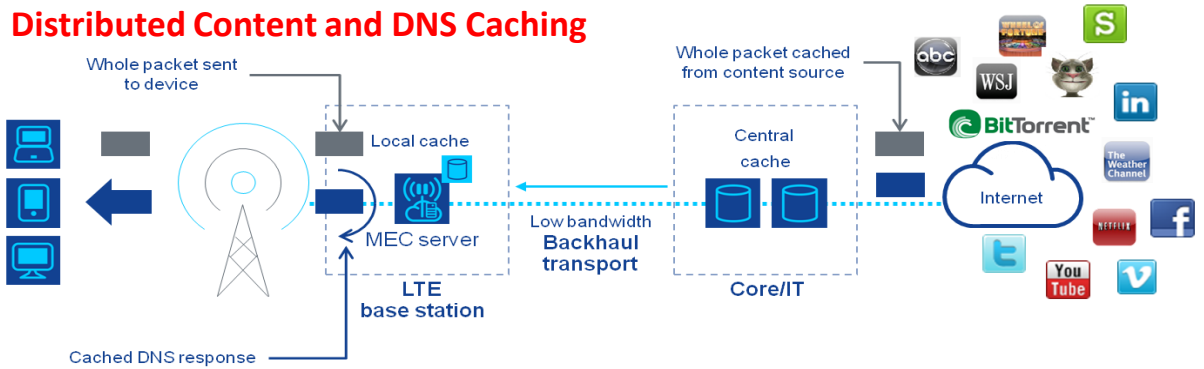
Cloud Computing/SDN/NFV are reshaping the IT/CT industry: more and more companies now announces cloud-based platforms and mobile video acceleration solutions based on NFV.

MEC (Mobile Edge Computing)-based Mobile Video Acceleration

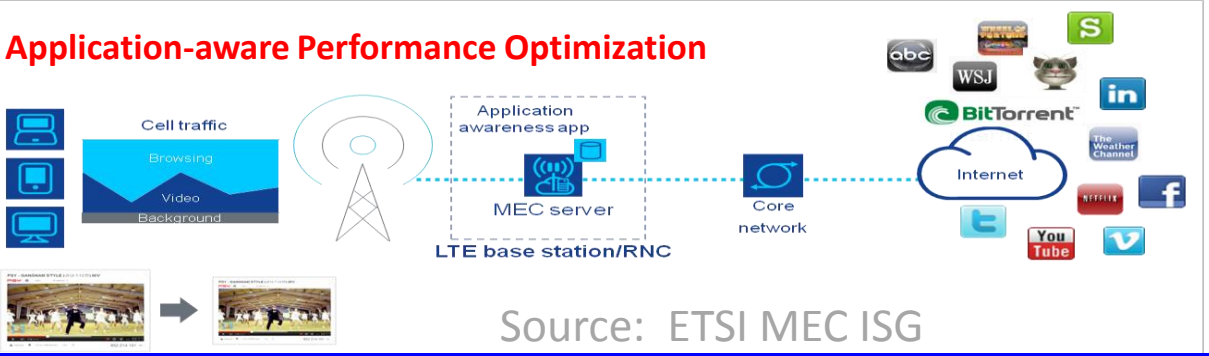
RAN-aware Content Optimization



Distributed Content and DNS Caching

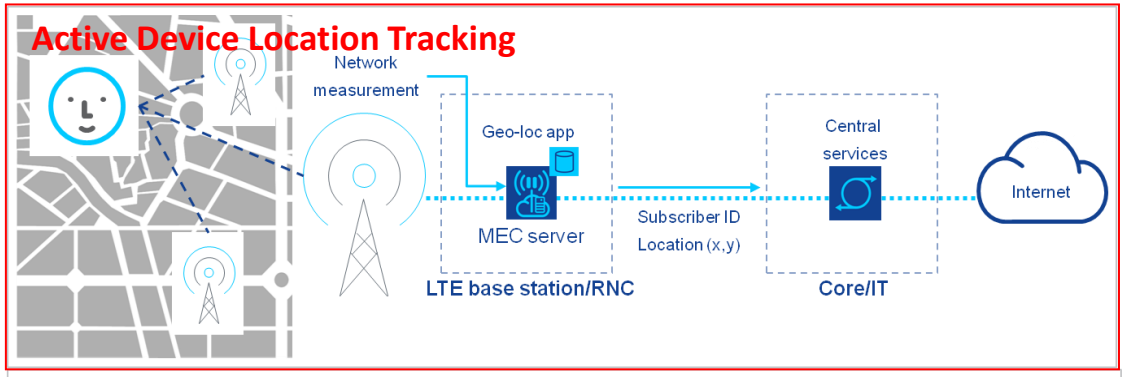


Application-aware Performance Optimization



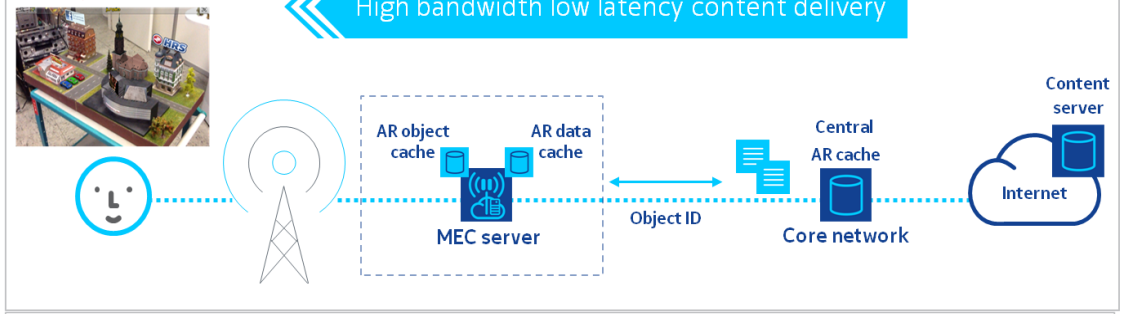
Source: ETSI MEC ISG

Active Device Location Tracking

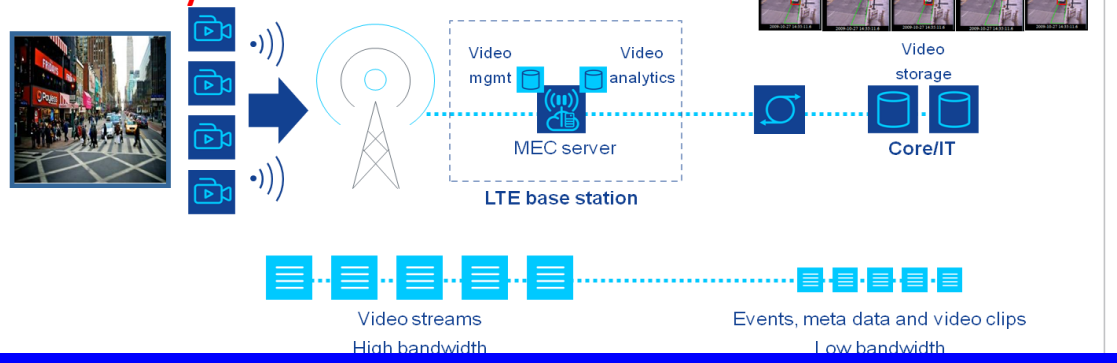


Augmented Reality Content Delivery

High bandwidth low latency content delivery



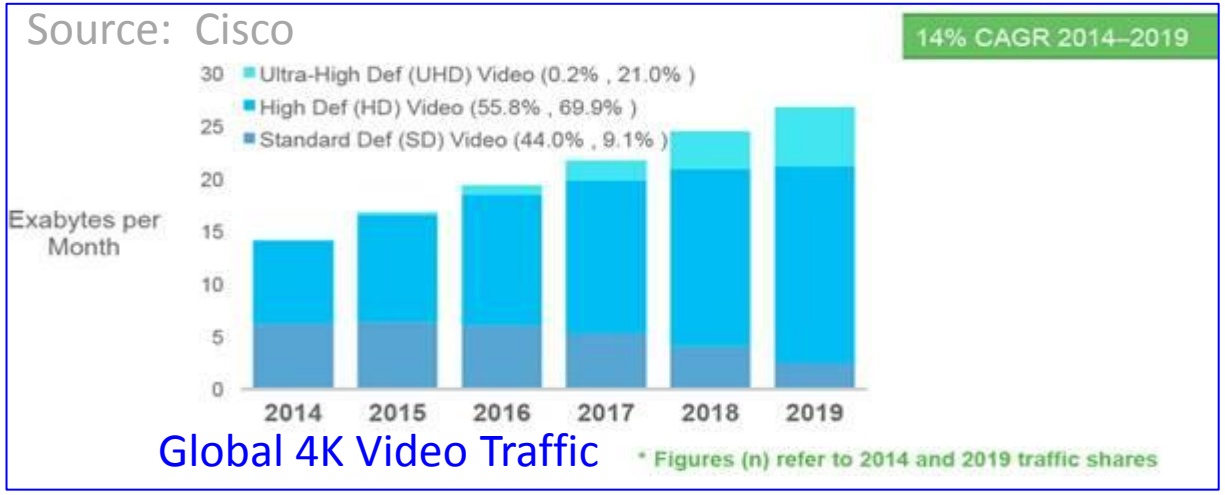
Video Analytics



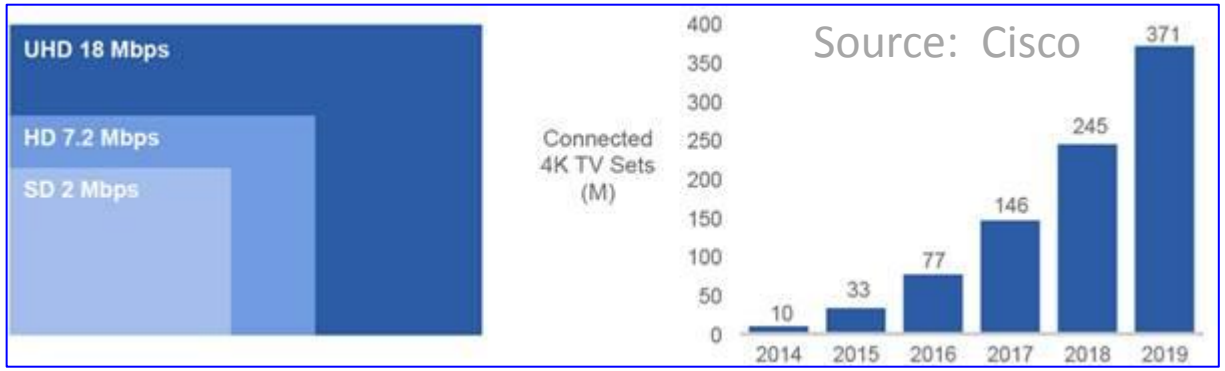
Based on mobile cloudlet (micro cloud) technology, more and more applications will be introduced into the mobile network, which realizes the NaaS. Because the mobile cloudlet closes to users, a lot of special acceleration can be deployed;

4K Creates New Industry Opportunities

Source: Cisco

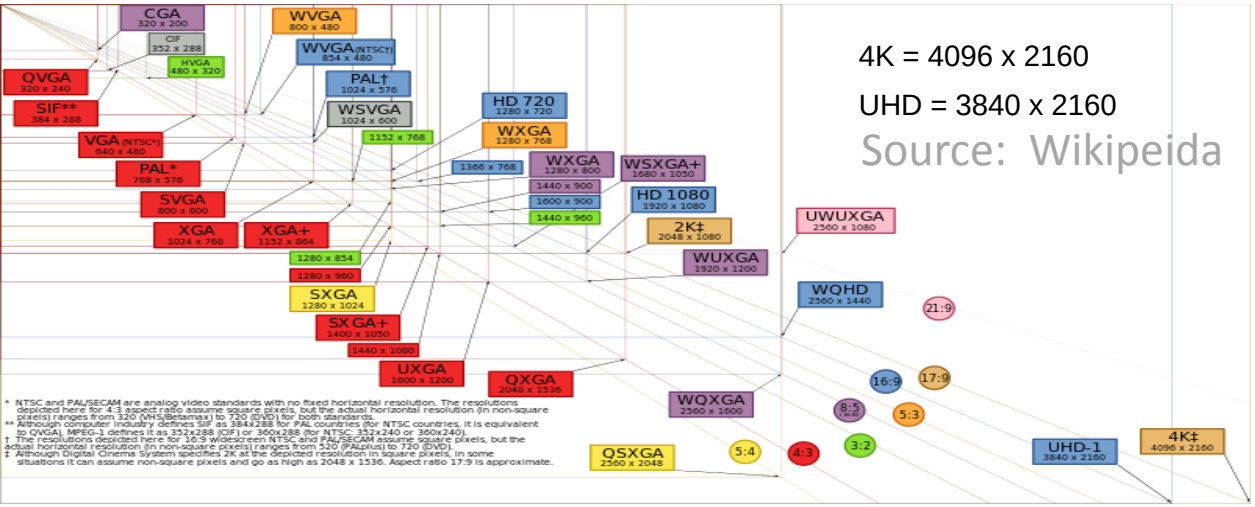


Global 4K Video Traffic * Figures (n) refer to 2014 and 2019 traffic shares



Source: Cisco

Increasing Video Definition: By 2019, More Than 30 Percent of Connected Flat-Panel TV Sets Will Be 4K



4K = 4096 x 2160

UHD = 3840 x 2160

Source: Wikipeida

Source: lightreading

News

Beamr Video to field breakthrough video optimization technology that can cut 4K HEVC bitrates by 50%

April 4, 2014 by itersnews 0 Comments

Source: Itersnews

4K video will soon create & establish new opportunities for the (mobile) video industry and eco-systems;

Wireless AR requires big BW and Near-Zero Delay of UL Mobile Video

AR

Source: cohlab.com

VR

Source: wikipedia

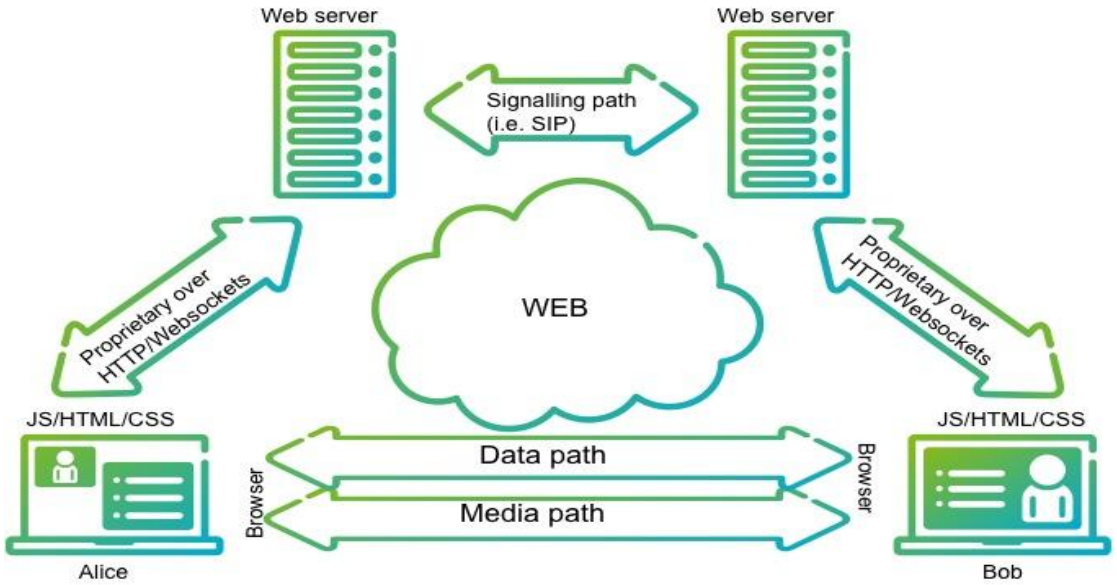
AR implementation approach diversity determines the BW and delay of UL Video transmission, but all requires the shorter delay of transmission and processing.

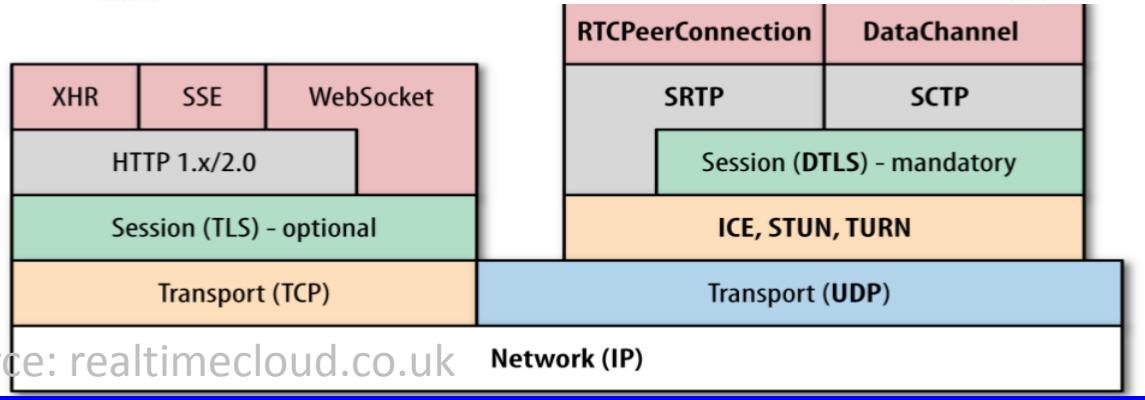
Note: Currently, the VR's relationship with the cellular network is still not very clear.

HTML5/WebRTC interactive video services may explode soon

Source: www.slorento.com

Source: www.prweb.com

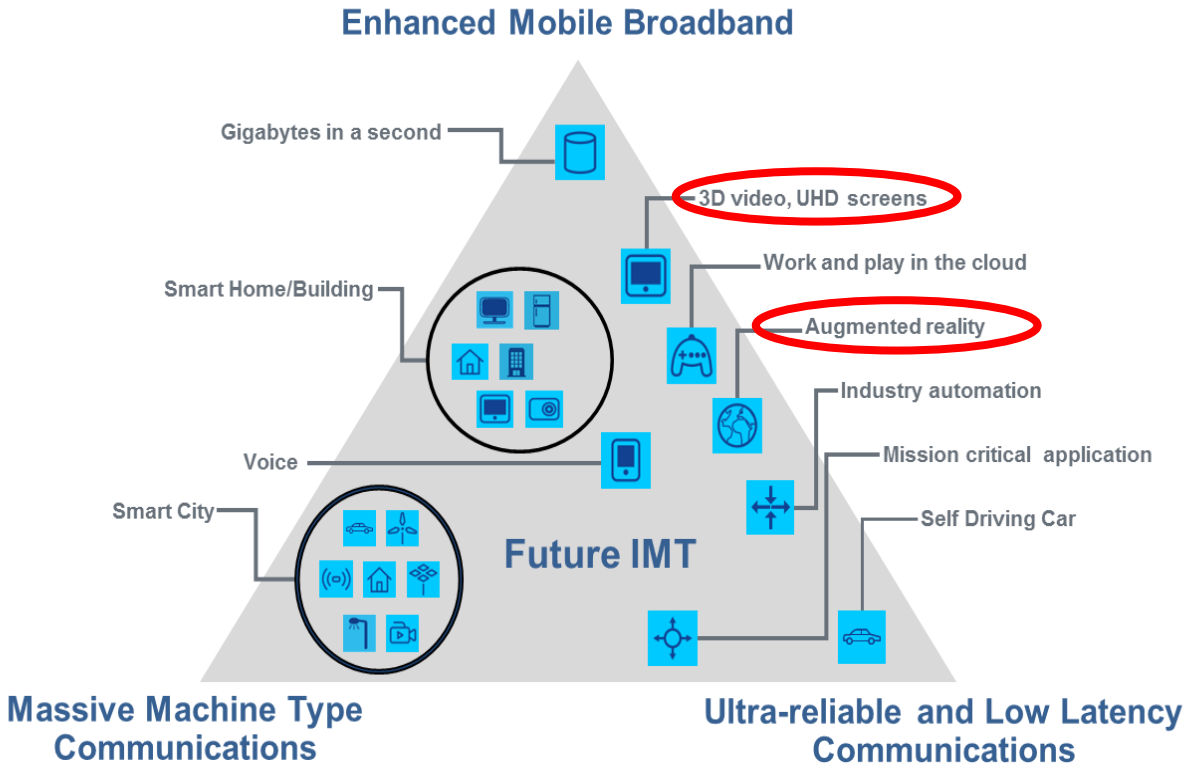




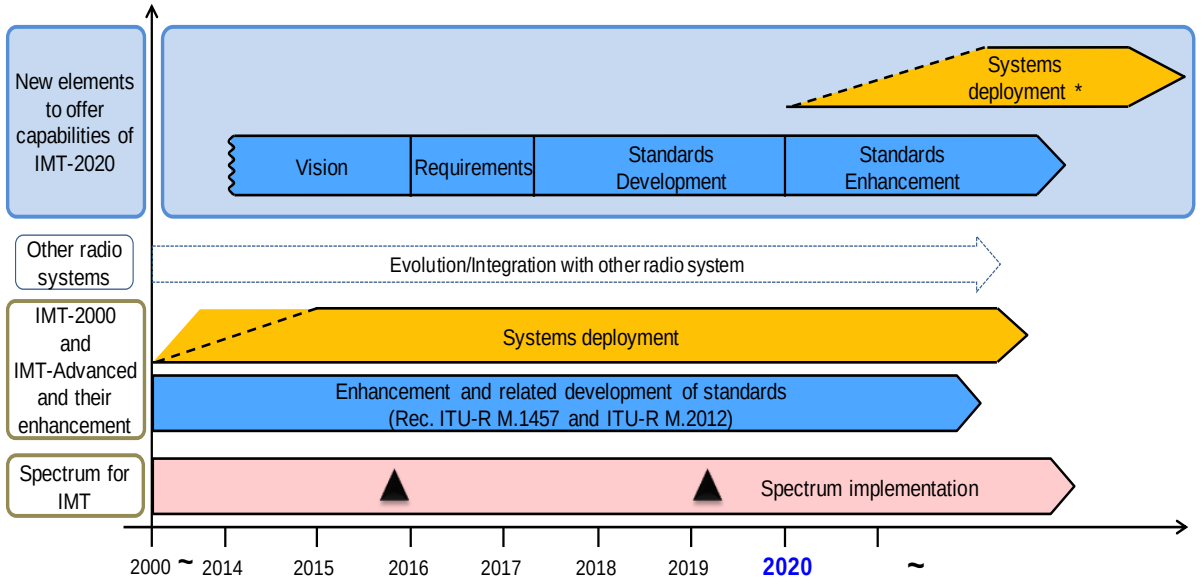
Source: realtimecloud.co.uk

At present the Browser-based HTML5/WebRTC real-time video services still have some QoE problems, the QoE guarantee of Interactive video/whiteboard faces more challenges.

Mobile Video is one of the three key 5G (IMT-2020) Requirements



Source: ITU



The sloped dotted lines in systems deployment indicate that the exact starting point cannot yet be fixed.

▲ : Possible spectrum identification at WRC-15 and WRC-19

* : Systems to satisfy the technical performance requirements of IMT-2020 could be developed before year 2020 in some countries.
: Possible deployment around the year 2020 in some countries (including trial systems)

Source: ITU

3D/4K/UHD video will be the most important traffic contributor to the 5G cellular network. At the same time ensuring the 5G video QoE also creates new industry opportunities;

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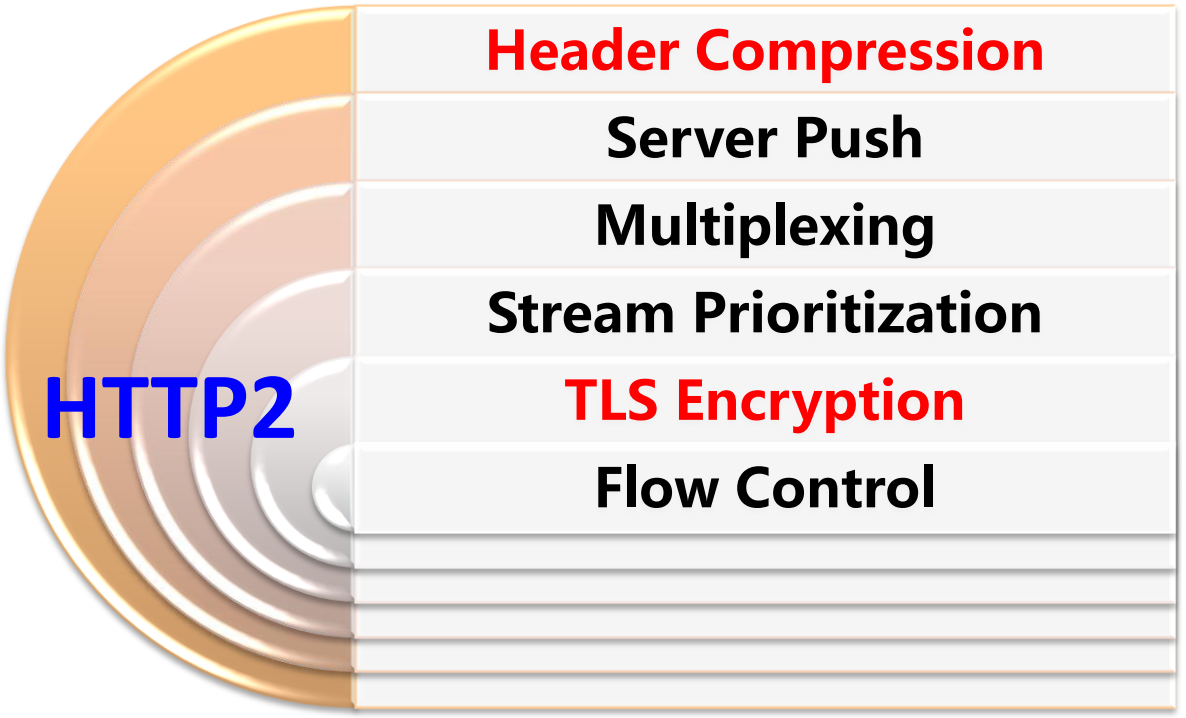
Widely using of HTTPS/HTTP2 makes the middle-box based mobile video almost impossible



Thursday, 05 March 2015 10:51

Openwave Mobility Debuts Secure Traffic Manager to Optimize Encrypted Video Streaming

Written by TechTeam

Source: www.thefastmode.com

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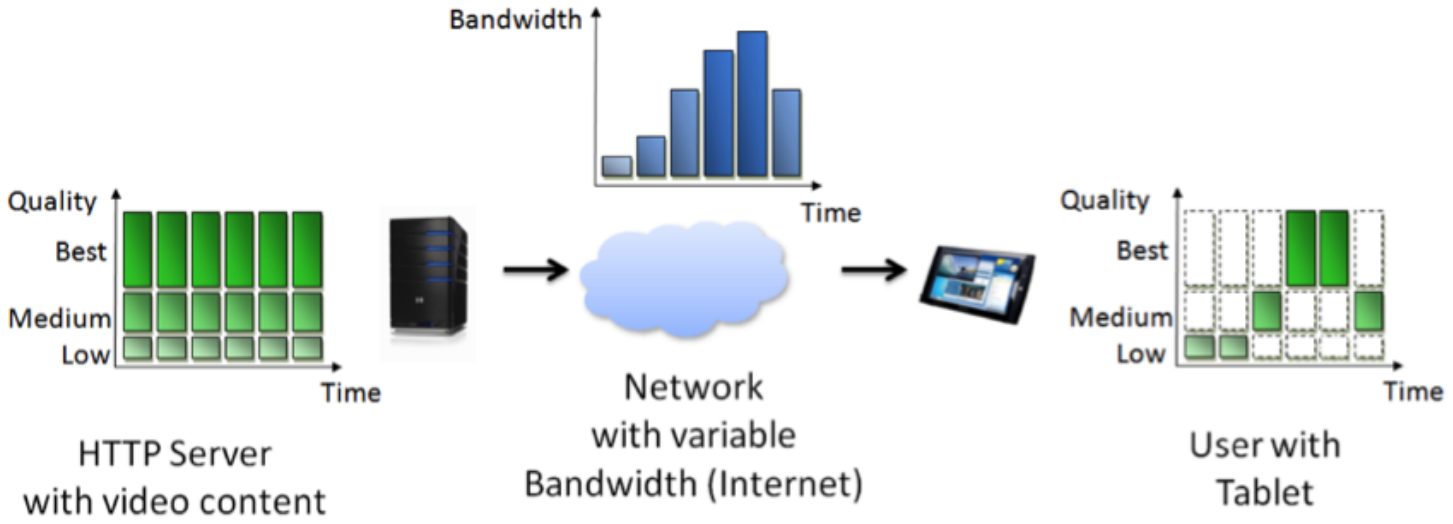
Openwave Mobility, a software innovator enabling operators to manage and monetize mobile video traffic, has unveiled a new solution, Secure Traffic Manager, leveraging its NFV-enabled Integra, that optimizes encrypted mobile video and audio streaming traffic.

Image Credit: Openwave Mobility

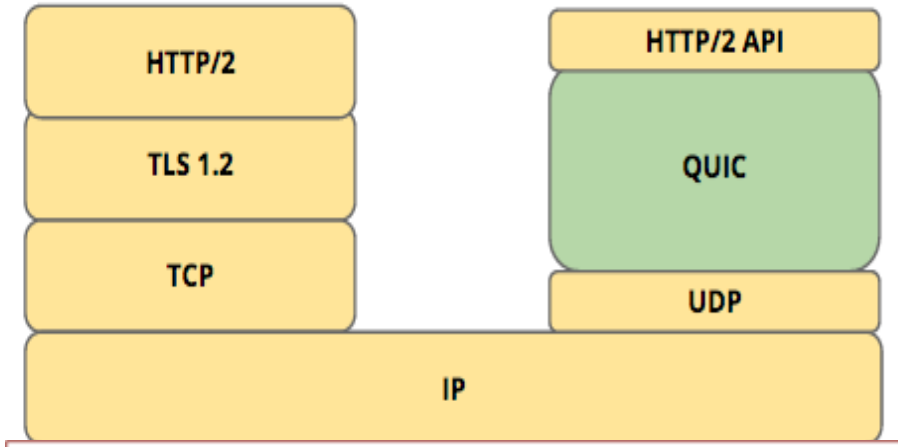
The Secure Traffic Manager is designed to dynamically recognize and fingerprint bandwidth-hungry objects such as High Definition video, audio or apps using a patent pending heuristics method to deliver optimized traffic via the Radio Access Network (RAN).

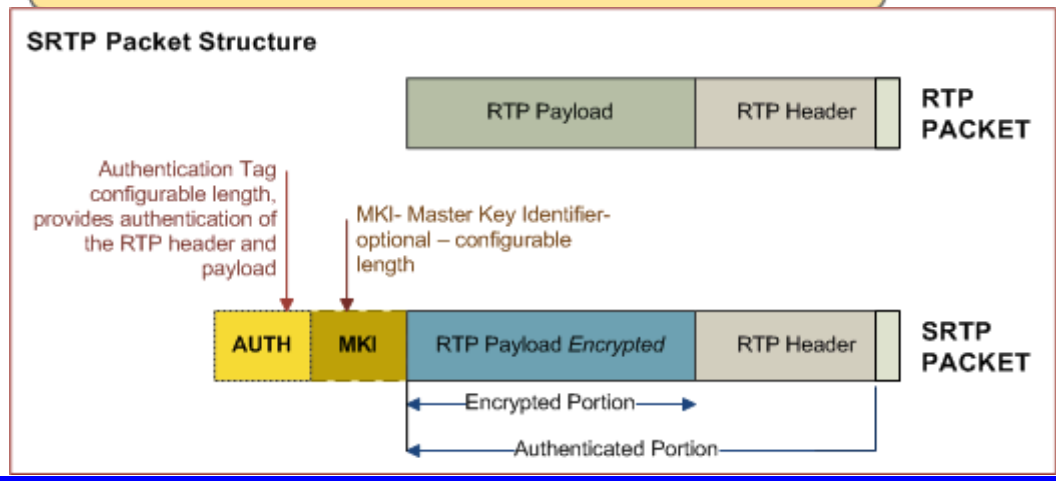
OTT encryption of the service data flow makes the network become dumb pipe; the cellular network operators position and the influence in the video/content industry chain is declining further;

OTT E2E DASH/SRTP/(D)TLS Technologies Transparently Pass Through Cellular Network



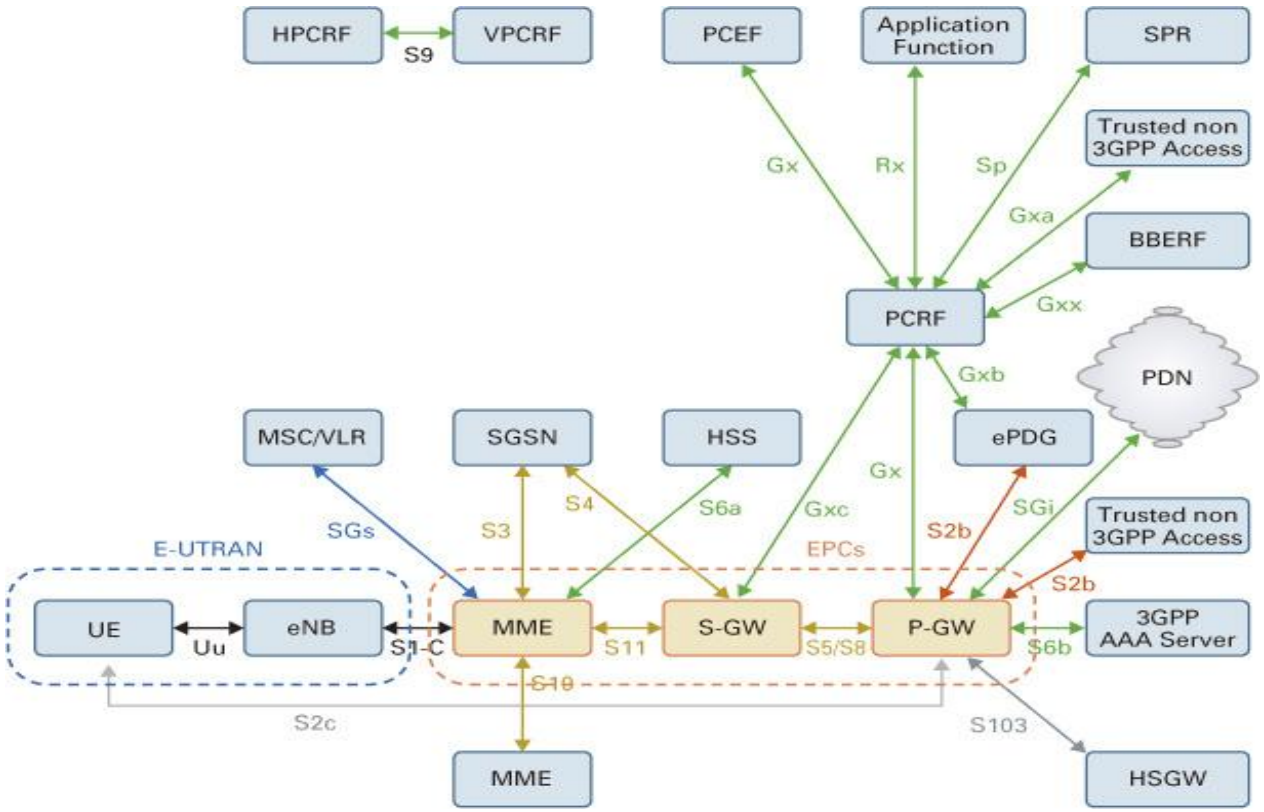
Source: records.sigmm.ndlab.net





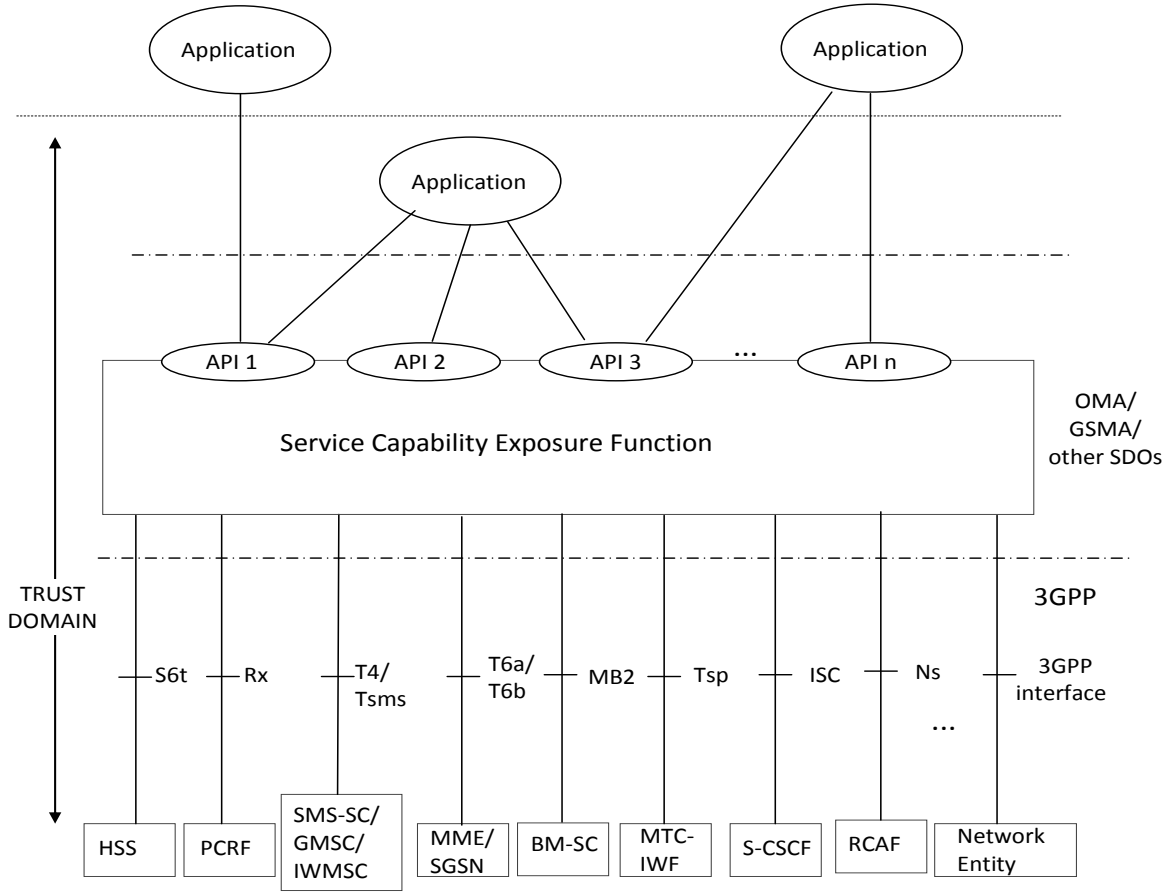
The E2E interaction between UE APP with the OTT Server (such as bandwidth detection, encryption, flow control) automatically adapt the video Codec/Rate along with network bandwidth changes and transparently pass through all transport network functions.

Cellular Network Capacity Open API Lacks Support from OTTs



3GPP Architecture with QoS capability Openness

Mainly for Walled Garden Services



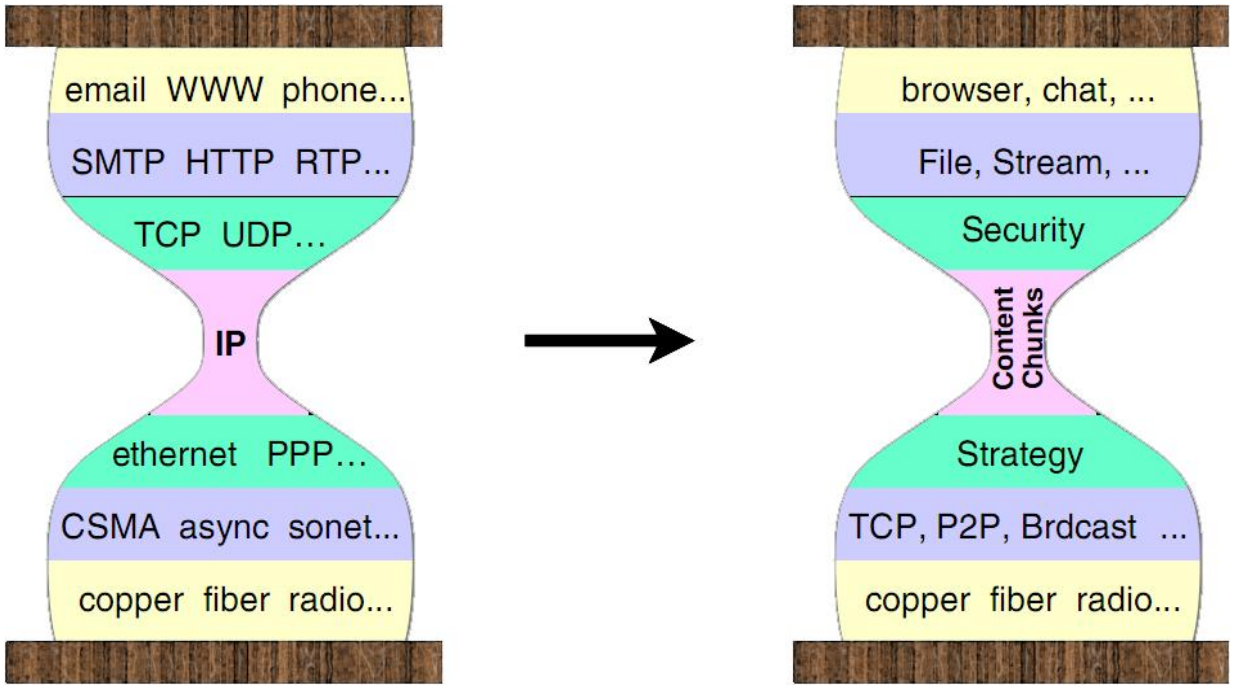
3GPP Architecture for Service Capability Exposure

Mainly for OTT Services

PCRF-based QoS capability openness mainly aims at operator's Walled Garden Services, TDF/DPI does not work well facing the E2E encryption. The SCEF-based network capability openness to OTT still remains to be seen ;

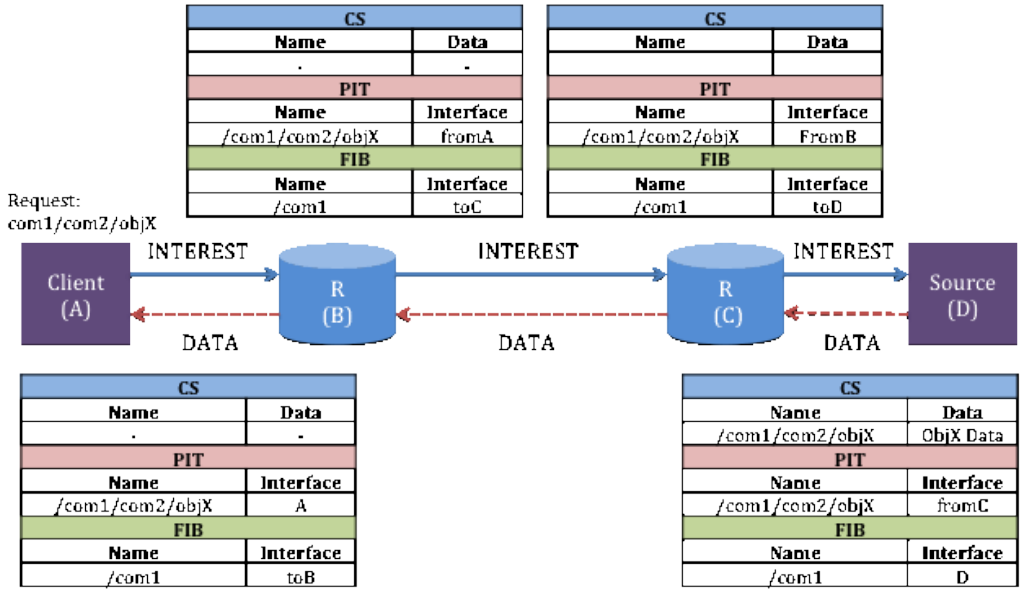
ICN/CCN/NDN Video Transport Solutions are far from Large-Scale Deployment

ICN： Information Centric Network
CCN: Content Centric Network
NDN: Named Data Network



From IP-centered to Content-centered hourglass model

Source: www.cse.wustl.edu



NDN Name-Based Routing Architecture

The new Clean-Slate ICN/ CCN/NDN network architecture proposed during the research procedure for the Future Internet still have so many challenges to be resolved;

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Thoughts on Mobile Content Delivery

- Along with mobile user and IOT machine are generating huge volume of Video, AR/VR/3D/4K/UHD with 5G/MEC/NFV/SDN/Distributed GW creates new mobile video industry and **business opportunities**;
- Video QoE will be one of the most important KPIs for cellular operators;
- A good mobile content delivery solution needs to solve and cover from Up to **Down,E2E and system-level thinking and cooperation**:
  - Up to Down: Application(i.e. Web, Video), transport (HTTP1/2,TLS,TCP), Cellular Network
  - E2E: User preference, UA capability, Radio link & Cellular network Capability , Routing path, Web Server, Content ;
  - An overlay solution over cellular network generally faces a lot of challenges: Mobility, Bearer Binding, Charging;
  - MCD-based solution normally is very hard to be standardized.
- The current **industry environment** is unfavorable to mobile network operators and MCD solution providers, they need to develop friend business environment:
  - Net Neutrality
  - User Content Privacy ← American government's large scale clandestine surveillance program
  - OTT/CP's Content Property
    - HTTPS

Thank you

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