IPTV Delivery Architecture

Dr. Simon T Jones
BT
Chief IPTV Architect
IPTV is defined as

- Multimedia services:
  - Television / video / audio / text / graphics / data
- Delivered over managed IP based networks providing appropriate
  - QoS / QoE, security, interactivity and reliability.

Key features of IPTV

- Supportable by NGN
- Bi-directional networks
- Real time and non-real time service delivery
IPTV Concept & Roles

Content Provider

Service Provider

Network Provider

Customer

Content

Stream

Transact

Deliver

Control

Decode

View
IPTV Roles [Domains]

- **Content Provider**
  - Owner of content
  - Delivers contents as: Streams, Files, Tapes ...

- **Service Provider**
  - Provides IPTV Service
  - Ingests and protects IPTV content

- **Network Provider**
  - Delivers streams from Service Provider to Customer

- **Customer**
  - Selects and consumes content
  - Pay bills
Derive Requirements from Service Outlines
Linear TV with Local PVR
Linear TV with Local PVR

- Multicast distribution
  - Very low error rate, low latency transmission
    - Potential need for network and application layer FEC
  - Multicast control in LAN and WAN

- QoS in Network
  - Ensure IPTV traffic not disrupted by other traffic
    - WAN Traffic prioritisation
    - Admission control, especially for Access Network

- Local Storage in IPTV Terminal
  - PVR, Trick play (Fwd, Rew, Slow ...)

- TV Service
  - User and subscription management
Content on Demand

Content Provider

Service Provider

Network Provider

Consumer Network

Content

Stream

Select & Control

Deliver

Decode

View
Content on Demand

- **Unicast distribution**
  - Very low error rate, low latency transmission
    - Error Correction by
      - Network and application layer FEC
      - Retransmission

- **QoS in Network**
  - Ensure IPTV traffic not disrupted by other traffic
    - WAN Traffic prioritisation
    - Admission control, especially for Access Network

- **CoD Service**
  - User and subscription management
  - CoD management and control server
Pre-delivered Content on Demand
Pre-delivered Content on Demand

- Delivery Options
  - Unicast
    - Error free reception by protocol
- Network Control
  - Limited or no Admission Control or QoS
- Local Storage
  - Delivery and Trick play (Fwd, Rew, Slow ...)
- CoD Service
  - User and subscription management
  - CoD management and control server
Hybrid: Online and Off-air Delivery
Hybrid: Online and Off-air Delivery

- **Online Requirements**
  - As per Content On Demand

- **Off-Air**
  - Local Terrestrial or Satellite Receiver
  - Local Storage in IPTV Terminal
    - PVR, Trick play (Fwd, Rew, Slow ...)

- **Service Requirements**
  - As per Linear TV and CoD
Service Operational Requirements

- Customer Domain
  - Network connection with LAN QoS
  - IPTV Terminal
    - Set Top Box connected to a TV
    - Soft-client on PC or Games Console

- Service Provider Domain
  - Operational and Business support systems
    - CRM, Fulfilment, Assurance, Configuration, Billing, ...
  - IPTV Application
    - Content identification, selection, purchase, ...

- Content Provider Domain
  - Production, Contract Management, Encoding, ...
Common Network Requirements

- **Network Transport**
  - Multicast streams - one to many
  - Unicast streams - one to one
  - Point to point IP connectivity

- **Network Authentication**
  - Normally provided by Home gateway

- **Network Upstream & Downstream Control**
  - Admission Control
  - Traffic Prioritisation

- **Network Session**
  - Multicast - long duration, maintained across channel changes
  - Unicast - duration same as content
Add Detail to Domain Model
IPTV Functional Components

- **Customer**
  - Home gateway, Set Top Box, Display, PC, Phones

- **Content Provider**
  - Content: Files & Off-air streams

- **Service Provider**
  - Streaming, Digital Rights Management (DRM), Service Portal
  - Customer Relationship Management (CRM), Billing
  - Customer Profiles, Customer Identity, Service Management

- **Network Provider**
  - Management, Control & Quality of service
  - Transport: Fixed (DSL, Fibre, Cable), Mobile
IPTV Domains and Sub-Domains

- **Home Network**
- **Home Devices**
- **Customer**

**Content Provider**
- **Service Provider**
- **Execution**
- **Management**
- **Content**

**Network Provider**
- **Access**
- **Metro**
- **Core**
- **Control**
IPTV Domains and Sub-Domains

- **Customer**
  - Home Network
  - Home Devices
- **Service Provider**
  - Service Management
  - Service Execution
  - Content Processing, Management & Streaming
- **Network Provider**
  - Control & Management
  - Transport: Core, Metro & Access
- **Content Provider**
Consider Delivery Over Real Network Architecture
Typical Network Hierarchy

- Super Head End
- Video Hub Office
- Video Serving Office
- Aggregation
- Access
- Backhaul
- Core
- Inner Core
- Outer Core
- Metro
- Access
Approaching Network Hierarchy

ITU-T IPTV Global Technical Workshop
Seoul, Korea, 12-13 October 2006
NGN Support of IPTV Requirements

- Network Transport
  - Multicast streams - Supported by NGN: IGMP & UDP
  - Unicast streams - Supported by NGN: TCP or UDP

- Network Authentication
  - Home gateway to NACF with DHCP / PPPoE

- Network Downstream Control
  - Admission Control - Supported by NGN: RACF
  - Traffic Prioritisation - Supported by NGN: MPLS
NGN Support of IPTV Requirements

- **Application Authentication**
  - Registration of IPTV Terminal to IPTV Application

- **Multicast Session**
  - Long lifetime (hours, days, ...)
    - Maintained when IPTV Terminal is active
    - Not impacted by channel change
  - Initiated by IPTV Application
  - Downstream control
    - Access network via RACF
    - Metro & Core by capacity planning
NGN Support of IPTV Requirements 3

- **Unicast Session**
  - **Shorter Lifetime (minutes, hours, ...)**
    - Maintained when Content is being streamed
  - **Initiated by:**
    - Fixed line IPTV: IPTV Application
    - Mobile IPTV: IMS
  - **Downstream control**
    - Access, Metro & Core via RACF
End

V 1.0
2nd October 2006