International Telecommunication Union

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"The role of home gateways in IPTV services, from a HGI perspective"

Dugerdil Bernard
Freescale Semiconductor
HGI Board Member

Home Gateway Initiative

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Why the Home Gateway Initiative (HGI)

- Unavailability of Home Gateways providing full support to the telecom operators' requirements for triple play services
- The Home Gateway is not seen as a generic advanced modem-router, but a service enabler device and an added value for both the customer and the service
- Fast answers to urgent needs
- Critical mass to reduce costs and increase functionalities
- **www.homegateway.org**

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HGI Successful Working Method

- Fast answers to urgent needs (top management roadmaps from the Telcos)
- Short-mid term vision (no R&D or visionary perspective)
- **Strong end-to-end architecture**
- **Critical mass on a wide set of requirements to reduce cost and time to market**
- Regional/local markets options and features will be allowed as add-ons to the main core of the HG
- **Feedback to relevant SDOs and cooperation with other bodies**
- **HGI is ITU-T A4 accredited (on process to be A5)**

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HGI and other organizations

- HGI is not a standardization body
- HGI is Home Gateway-centric, but fully integrated with an end to end network and service architecture (QoS, management, service provisioning, etc)
- HGI is rapidly filling the gaps in standards and helping other organizations to be consistent with an end to end network and service architecture for the benefits of the operators, the vendors and the customers
- HGI is participating to ITU-T “FGIPTV” work

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HGI Timeline

- December 15th 2004, founded by 9 members
- March 2nd 2005: official launch
- Approx. 66 members (1/4 Telcos) as of September 30st
- First week of July 2006, official publication of Rel.1 specs
- 1Q-2Q2007: Release 2

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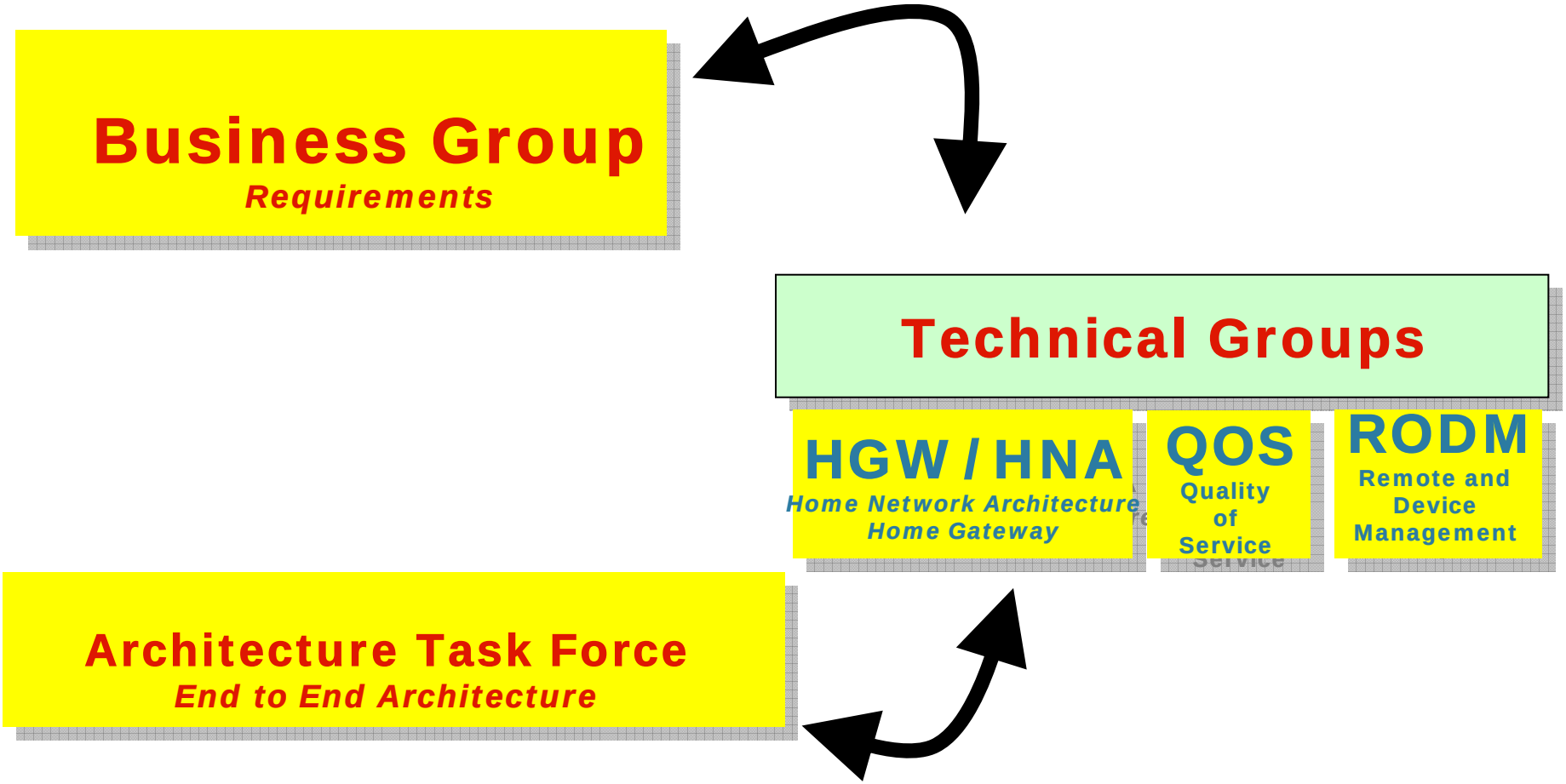
HGI organization and working method



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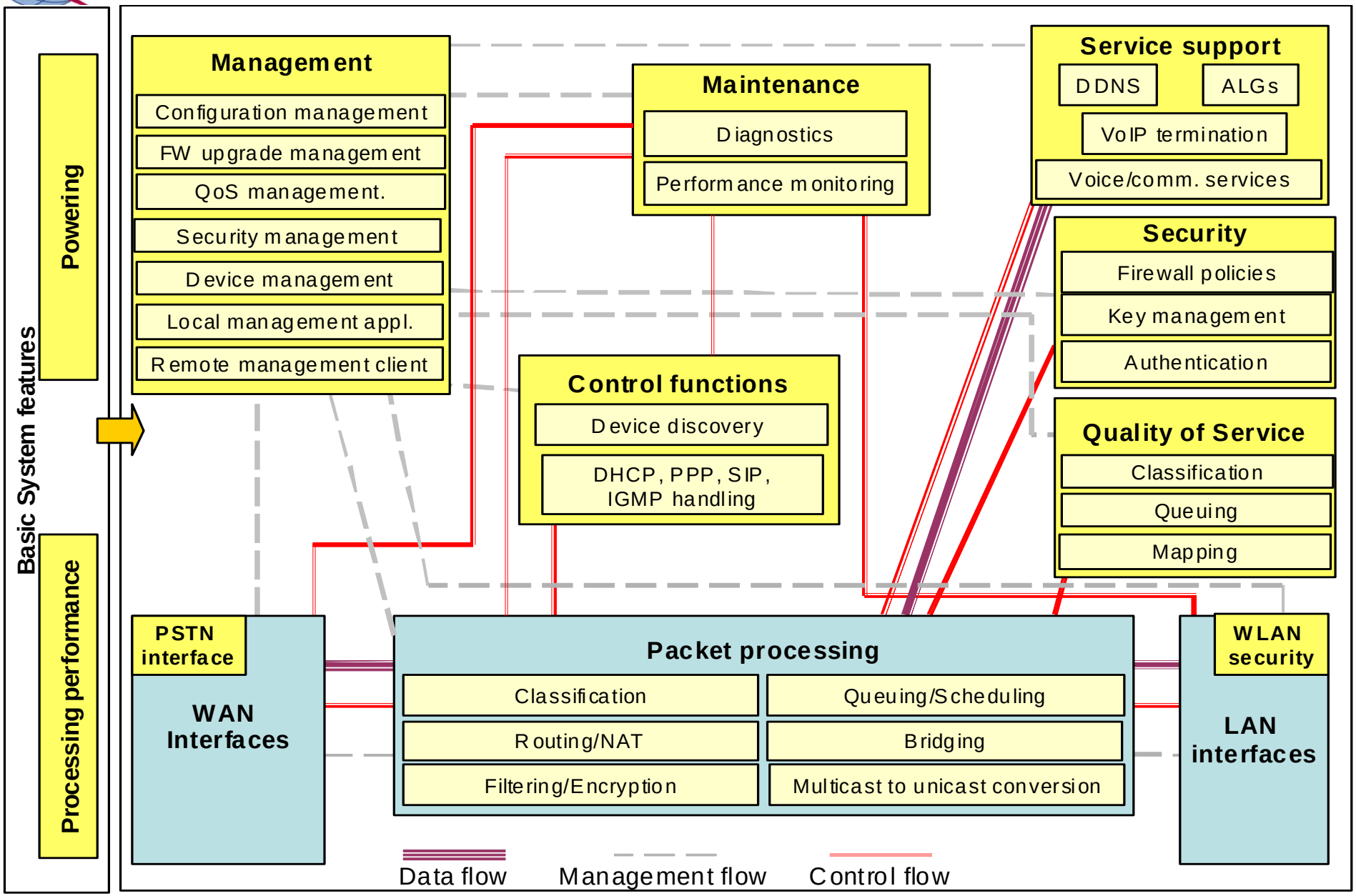
Release 1

- Basic statements
  - Network and Service Requirements
  - End to End Reference Architecture
- Home Gateway requirements
  - Interfaces
  - Processing
  - Connectivity
- Quality of Service
- Remote Management
- Service support
- Security
- Powering, safety and EMC

Home Gateway architecture



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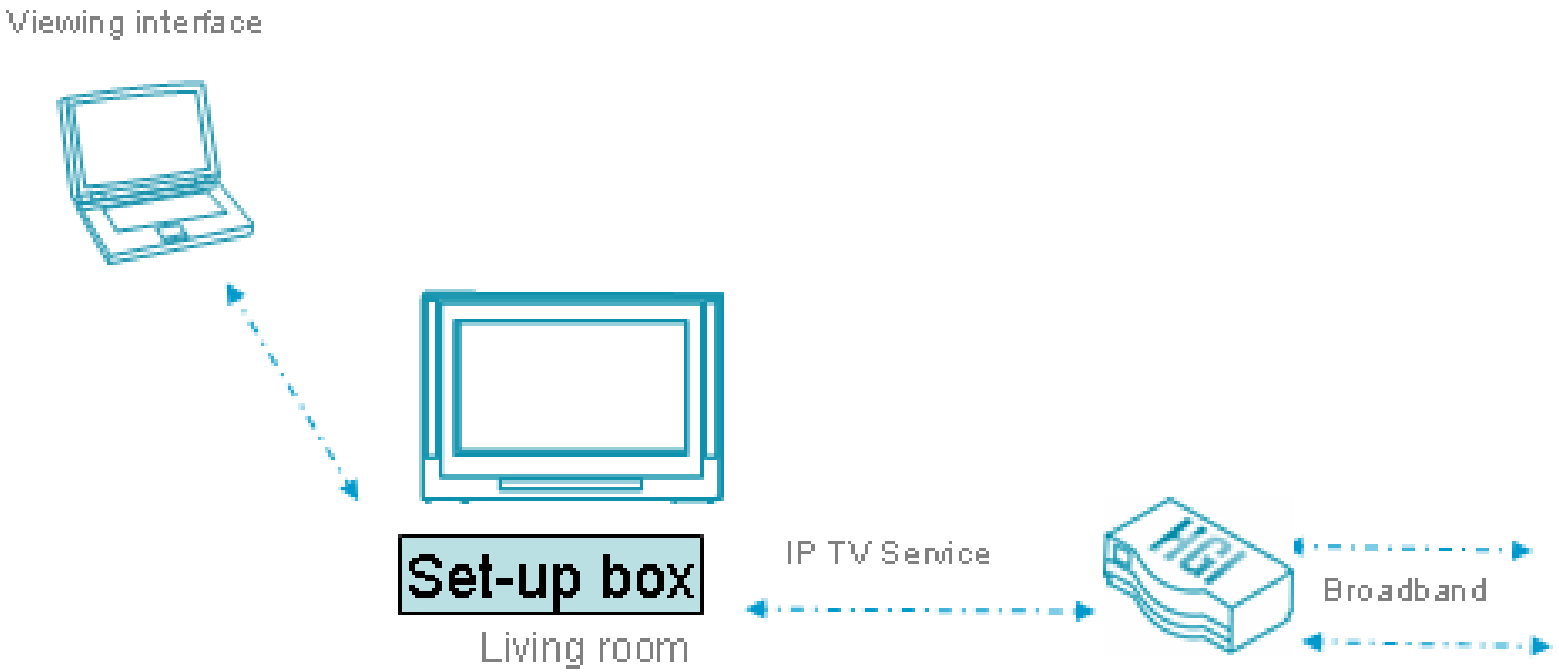
HGI Release 1: IPTV Requirements

Broadband IPTV - Digital TV Service

Reference Model



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Customer Requirements

- The Home Gateway must allow the customer access to the IPTV service
- The Home Gateway should support a unified IP home network
- The customer must be satisfied at all times that the BSP can only diagnose and view their home network and the traffic on it, under explicit permission from them. The Home Gateway should reinforce this privacy aspect by some means

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BSP Requirements

- The Home Gateway must support provisioning of the IPTV service. The Home Gateway is required to prioritize traffic in the event that there is not sufficient bandwidth in the home network and/or in the broadband line to simultaneously support the IPTV stream and other traffic
- Note: if the flow is protected through some kind of DRM mechanisms, it is expected that the viewing interface has appropriate DRM mechanisms.

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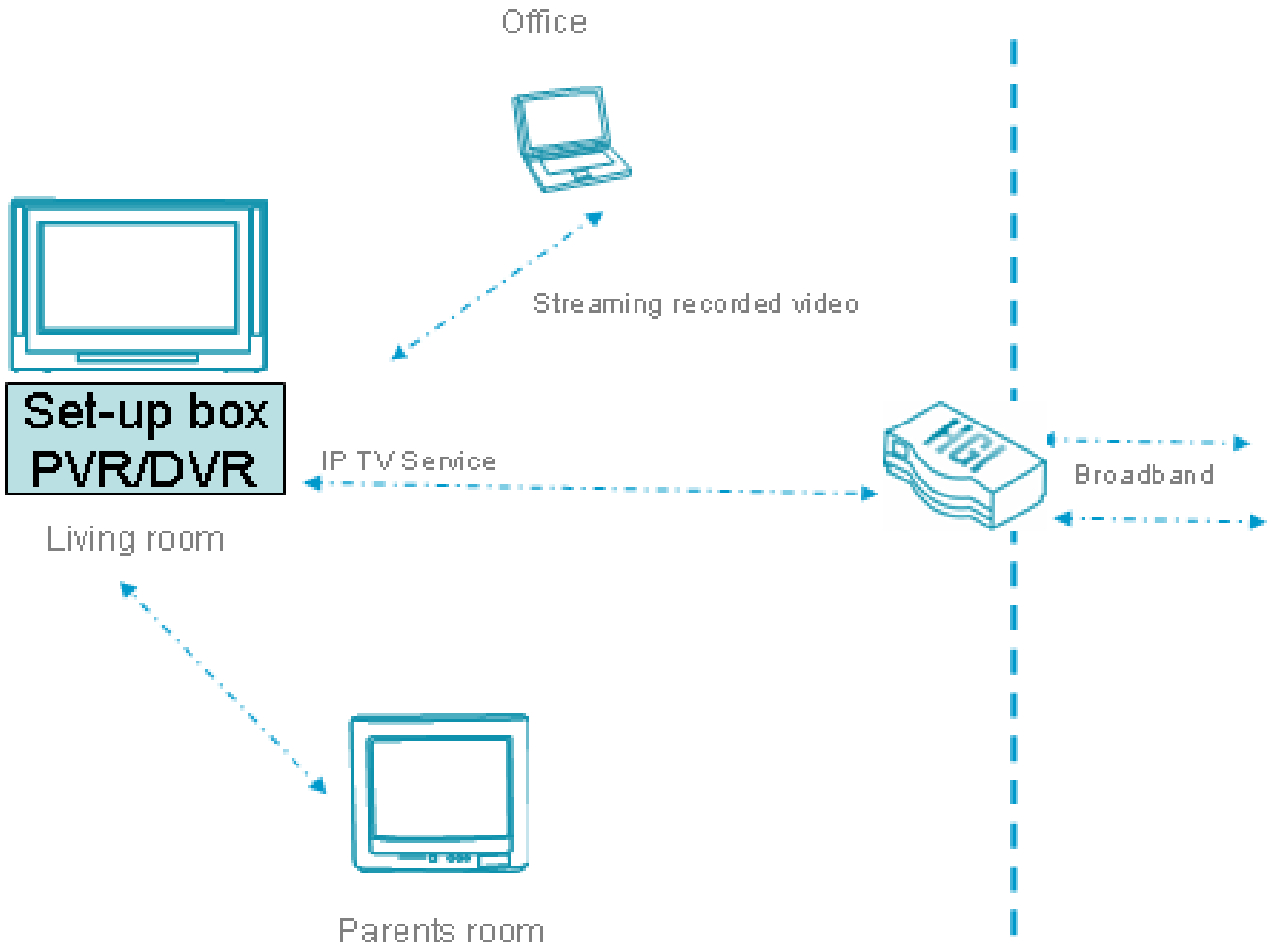
HGI Release 1: IPTV Requirements

PVR/DVR – home network Storage

Reference Model



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Customer Requirements

- The Home Gateway must allow the customer to install a PVR/DVR service
- The Home Gateway should support a unified IP home network
- The customer must be satisfied at all times that the BSP can only diagnose and view their home network and the traffic on it, under explicit permission from them. The Home Gateway should reinforce this privacy aspect with suitable mechanisms

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BSP Requirements

- The Home Gateway must support additions of IPTV streams to the home network. The number of streams may be limited depending on WAN, LAN network capacity
- The Home Gateway is required to prioritize traffic in the event that there are not enough resources in the home network to simultaneously support the IPTV stream and other traffic.

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HGI Release 1: IPTV Requirements

Media Gateway – Access from any terminal

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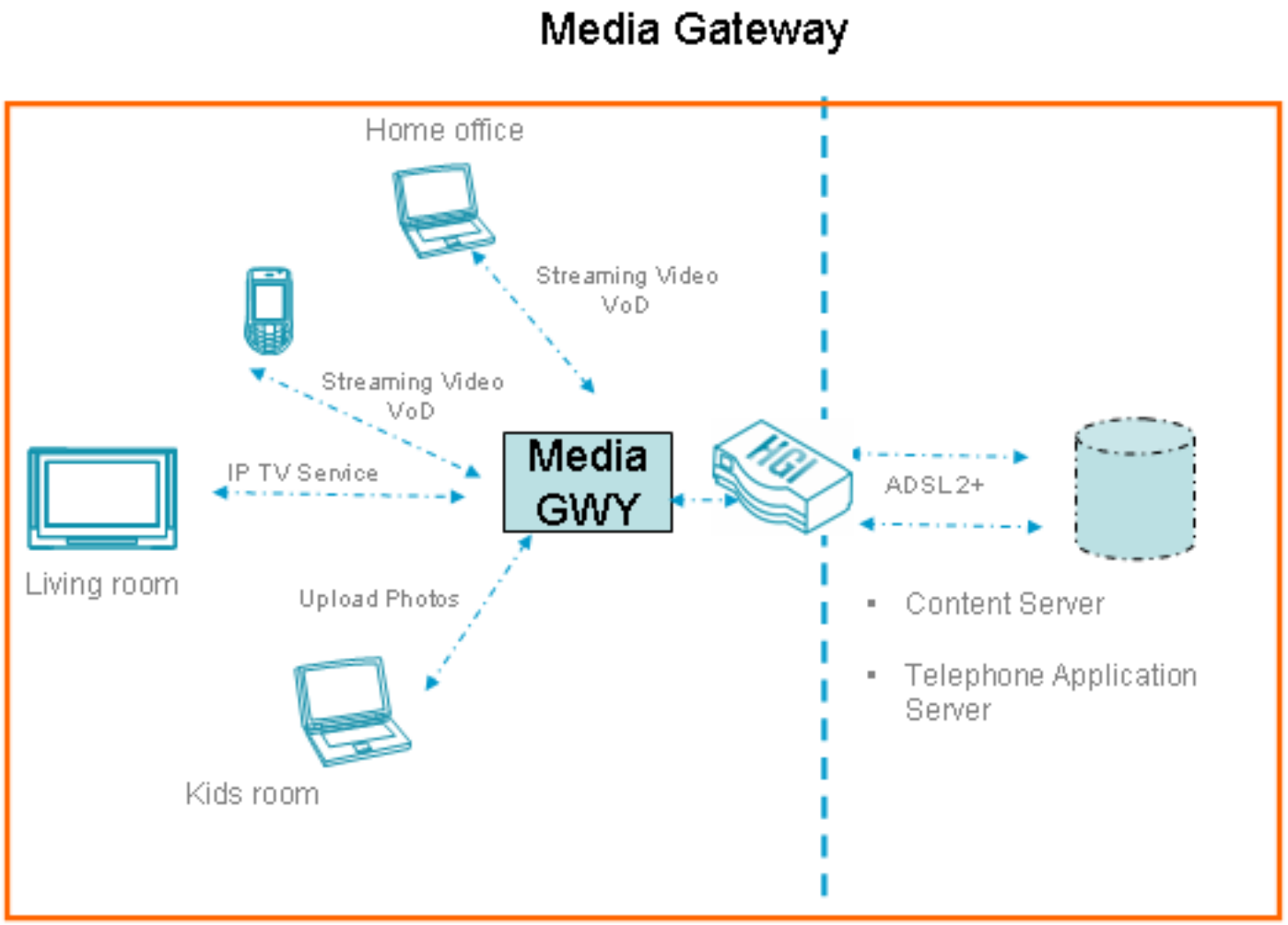
Reference Model



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Customer Requirements

- The service must be easy to activate and to use
- The service must be convenience to use
- The service must be reliable and secure (DRM).
- The service must provide a high degree of flexibility - add new devices, order new content services

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BSP Requirements

- The Media Gateway & service platform should be able to adapt to the device capabilities in terms of rendering the content.
- The Home Gateway should support the delivery of several content flows to different devices with the appropriate QoS.
- The Home Gateway & service must enable an easy and flexible connection of third party equipment (e.g.: Content Server).
- The Home Gateway must have remote and device management capabilities
- The Home Gateway must have a high flexibility for updates and new service activation

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IPTV True End-to-End Service

Home Gateway is the central point to manage Home Network QoS

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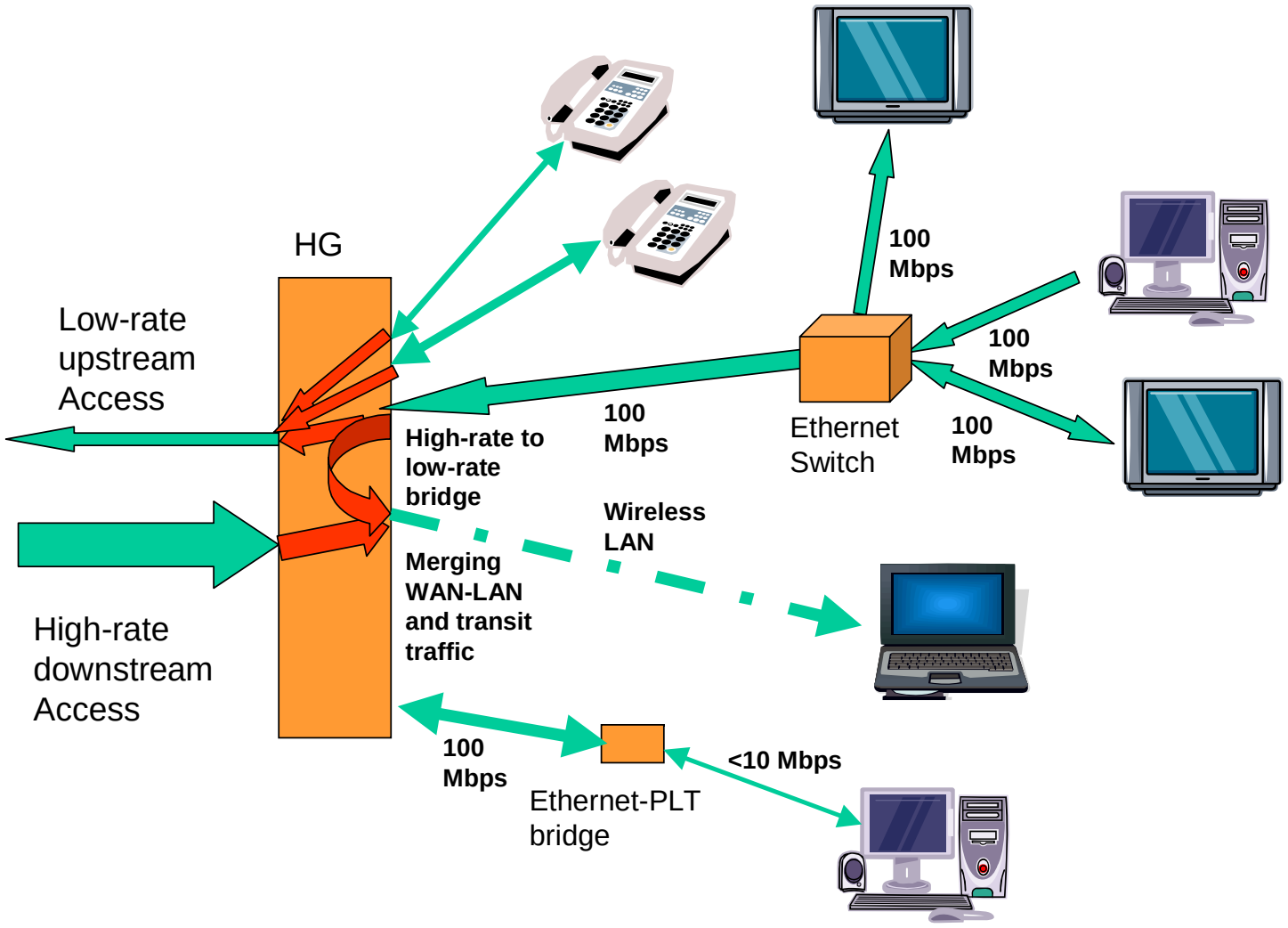
QoS Goals

- Management of key congestion points
  - Potential rate mismatches abound
- Traffic classification and prioritization
  - Telco-managed services vs unmanaged services
  - Special attention for voice/video
- Handle Diverse flows in the HG:
  - WAN→LAN (downstream)
  - LAN→WAN (upstream)
  - LAN-LAN (transit)
- Focus on QoS handling within the HG
  - With guidelines for LAN components

Potential traffic congestion points



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Use of DSCP and Layer 2 Markings

- The HG provides capabilities of classification and marking at layer 3 (DSCP)
- Layer 2 classification in the HG may also be supported
- Generally, layer 3 markings (DSCP) are preferred within the LAN
  - We do not wish to encourage use of VLAN tagging
  - DSCP is our preferred mechanism to transmit priority information to WIFI, Powerline, etc
  - Recommended DSCP marking consistent with DLNA usage

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Classification

- Classification requirements well delineated
  - WAN ingress
    - Multifield classification upon layer 4, IP and ethernet fields
  - LAN ingress/WAN egress
    - Multifield classification upon layer 4, IP and ethernet fields
  - LAN ingress/LAN egress
    - Typically, simpler classification based only on MAC SA/DA
    - Exception handling (multifield classification) for traffic destined to specified LAN ports

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Queuing

- Egress queuing model
- Packets are slotted into egress queues depending on classification and forwarding decisions
- Queue requirements
  - WAN egress – min 5 queues, 8 suggested
    - strict priority and WRR scheduling
      - Allows lowest latency to be accorded to voice and flexible allocation to other services
    - shaping at class and port levels
  - LAN egress ports – min 4 queues
    - strict priority and WRR scheduling

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Overload Protection

- An optional mechanism is defined aimed at preserving QoS of managed service flows in the upstream
- Requires identification of flow instance using classification
- Before admitting a new managed service flows to the premium queue, performance is first tested in a lower priority queue
- This mechanism ensures that already identified flows will not be adversely impacted by newly admitted flows

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Congestion Management

- Congestion management is a required configurable capability on all queues
  - Random Early Discard
- The purpose is to improve performance of TCP oriented traffic in the presence of congestion
  - Particularly applicable to upstream link

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Flow types - details

- Managed Services are typically WAN →LAN or LAN → WAN
- LAN-LAN flows are a “grey zone”. Typically these are unmanaged, BUT
  - Service provider may wish to provide QoS assistance to some LAN-LAN flows
  - Example: VoD download to be streamed to STB at a later time across the home LAN.
- Means to prevent LAN-LAN flows from disrupting managed WAN → LAN flows
  - Fixed queue allocation scheme
  - Optional deep classification of LAN-LAN flows

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Management of QoS Functions

- Phase 1 release of HGI builds upon DSL Forum protocols for managing HG QoS capabilities
- Management from a service provider's Auto-Configuration Server (ACS)
- TR-069 (CWMP) protocol
- TR-098 Data Model
- HGI specific QoS profile for TR-098

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Conclusions

- The Home Gateway is a key element within the IPTV chain
- Home Networking congestion is a fact. HG QoS mechanism must be able to guarantee IPTV flow within Home Network (HN)
- HG QoS Management from IPTV service provider is needed
  - Use of DSL Forum TR-069 and ACS (Autoconfiguration server)
- IPTV over IMS is a open question. HGI release 2 will be IMS compatible (IMS proxy)
- HGI is considered as a key element in the IPTV scenario BUT we need urgently an ITU-T “FGIPTV” recommendation and guideline
- ITU-T “FGIPTV” must elaborate different scenarios

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Questions ?