The Perspective and Realization of Multimedia services in ChungHwa Telecom

the 13th Annual WOCC 2004
MM Technical Session 1:
Industrial Adaptation and Technology Trend on Multimedia Coding

Dr. San-wei Sun
Managing Director, IMA Lab.
ChungHwa Telecom Laboratories, Taiwan
swsun@cht.com.tw

March 08, 2004

Agenda for Presentation

- Triple Play Trend in Taiwan
- CHT's Approach to the Multimedia Services
  - MOD and Hichannel
  - others
- Consideration and Realization of MM Coding Algorithm in CHTTL
- Concluding Remarks

Triple play trend in Taiwan

Triple play around the Telecom. world

- WCCP keeps its ADSL market via offering TV services
- Fastweb offered TV/VOD/video conference services over its FTTH/xDSL
- Yahoo BB! offers VoIP over their xDSL lines

Broadband Internet access:

- free Cyberspace information surfing
- ADSL circuit fee about 500-600NT$/Month
- e-mail the killer AP
- ADSL ISP fee about 400-500NT$/Month
- paid premium/MM content/services
- paid telephone/VoIP services
- Customer base still has some potential (3 Millions now) in Taiwan
- IP content providers are consolidated and gradually profitable

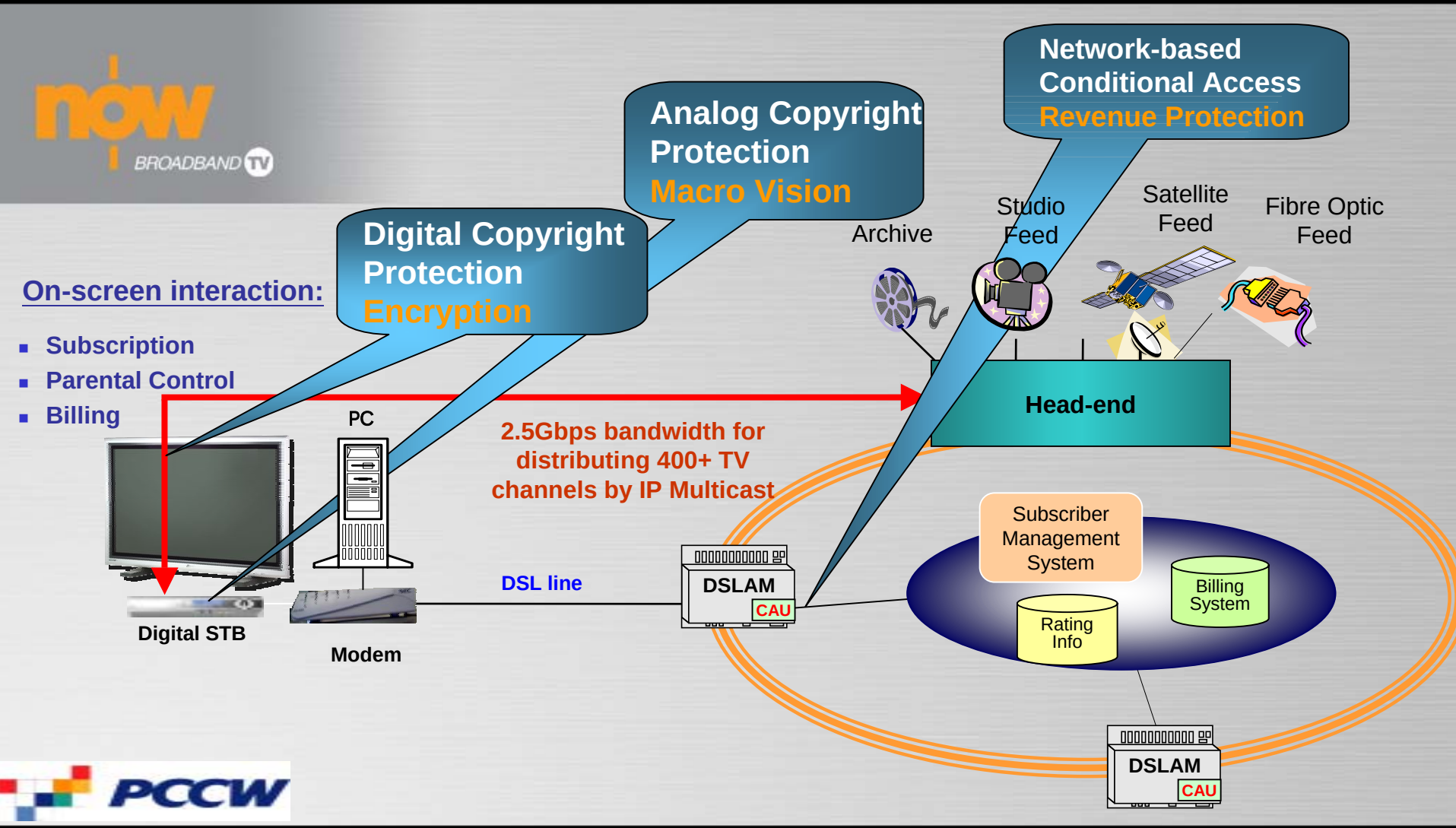
Cable TV:

- live TV service
- 600NT$ per month totally
- extra $ for paid channels, cable modem, cable phone
- customer base is about saturated (6.15 Millions, 80% penetration)
- geographically regulated market
- revenue share model is clear among content and delivery parties

Digital Convergence and competition

- NGN IP backbone and emergent DTV
- Some Telcos view VOD/live TV as an add-on to xDSL services
- Interactive/internet TV and shopping services (DVB-MHP)

The Technology Behind now Broadband TV



now Broadband TV Utilizing IP Multicast Technology

Source: PCCW

Fastweb TV, VOD and EPG

FASTWEB INNOVATIVE SERVICES: FastWeb TV

FastWeb TV

- ✓ Unified interface for content in all formats:
  - ✓ Terrestrial broadcast: RAI, Mediaset, ...
  - ✓ Satellite broadcast : CNN, Bloomberg, ...
  - ✓ Pay-TV/Pay-per-View: Stream & TELE+
  - ✓ Video-on-Demand
- ✓ Integrated with VideoREC and Electronic Program Guide

Video-on-Demand offer

- ✓ Over 3,000 titles
- ✓ First VoD licensing agreements in Italy with US major film studios:
  - ✓ 20th Century Fox
  - ✓ Universal Studios
  - ✓ DreamWorks

Broadband Network: FTTH (10Mbps), ADSL(4Mbps)
Unicast MPEG-2 at 4Mbps, Multicast MPEG-2 at 2~4Mbps (Intranet)

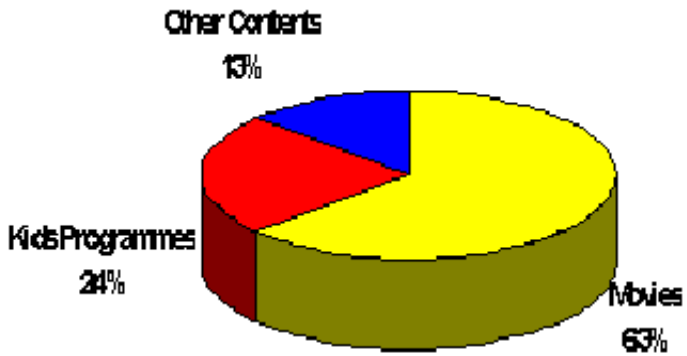
Source: FastWeb

VOD usage

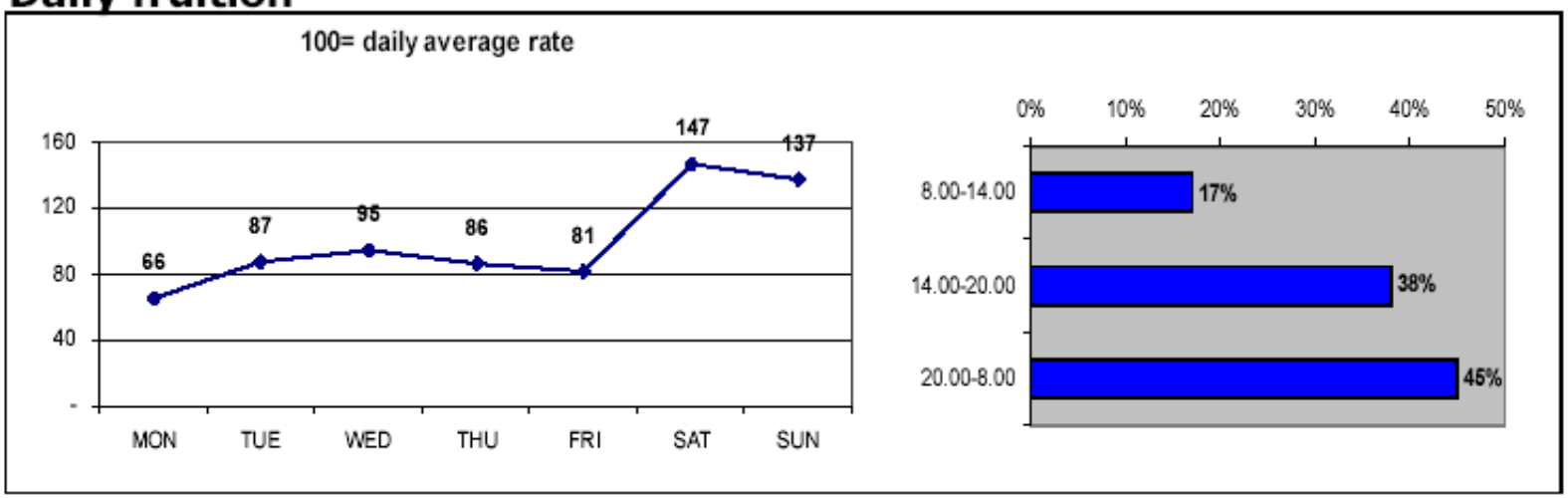
Figures

As of today…

- E.BisMedia customers spend over 7 hours per month viewing programs on their TV on Demand
- Accesses concentrate in the evening and during the weekends
- VoD Arpu is over 11,00 € /month (excluding STB rental)



Daily fruition



Source: FastWeb

Monthly Internet Activities at Home in Taiwan

網路活動/普及率(%) Internet Activities/popularity %	2003年
瀏覽資訊 **Information browsing**	80%
收發電子郵件 **e-mail communication**	77%
閱讀新聞 **news read**	55%
上傳與下載檔案 down/up load file	51%
線上遊戲 **on-line game**	35%
傳送即時短訊（ICQ、MSN, etc.）	31%
到聊天室（聊天、交友）chat	26%
線上影音視訊（收聽電台、收看電視電影）**MOD - VOD/TV/radio/music**	23%
線上學習 **e-learning**	20%
求職求才 job finding	15%
線上購物（購買產品或服務，以商家標定的價格購買）**e-shopping**	15%
使用電子化政府服務（報稅、申請與上傳表單）e-government services	13%
線上拍賣（網路拍賣物品或服務、有參與競標行為）e-auction	12%
線上金融（實際線上進行投資理財）e-banking	9%
繳交帳單、罰款 e-payment	7%
網路電話 **VoIP**	4%

Source:
經濟部技術處「產業電子化指標與標準研究」科專計畫／資策會電子商務研究所FIND 2003/12/25

Content

- Triple Play Trend
- CHT's Approach to the Multimedia Services
  - MOD and Hichannel
  - others
- Consideration and Realization of MM Coding Algorithm in CHTTL
- Concluding Remarks

CHT's Approach to the Multimedia Services

- **CHT current status**
  - the leading supplier of ADSL (3 Millions), POTS service, etc. in Taiwan
  - Government e-Taiwan target and push: 6 Million BB subscribers at year 2008
  - declining communication fee, content for revenue sharing, Matured MM technology, and demanding quality of service
  - backbone bandwidth is still abundant
  - current video conference service is not very profitable
- **To promote higher access bandwidth, to attract new video services, and to prepare for a new triple play era**
  - CHT ADSL access bandwidth raised from 1.5M/64K to 2M/128K automatically and free of charge from Feb. 1st, 2004. 800,000 subscribers are affected (25%) - will now offer an acceptable video quality (WMV9 visual rate can be raised from 700Kbps to 1Mbps, VoIP will be more available.) (# of 512k/512k ADSL subscribers reaches 54K)
  - CHT will offer MM services like distant learning, distant surveillance, VOD, live TV, Karaoke, on-line game, product VR and T-commerce, home ATM, etc.
- **Syndicated contents delivered over fixed line and cellular: Internet access, SMS/MMS/MHP, ...**

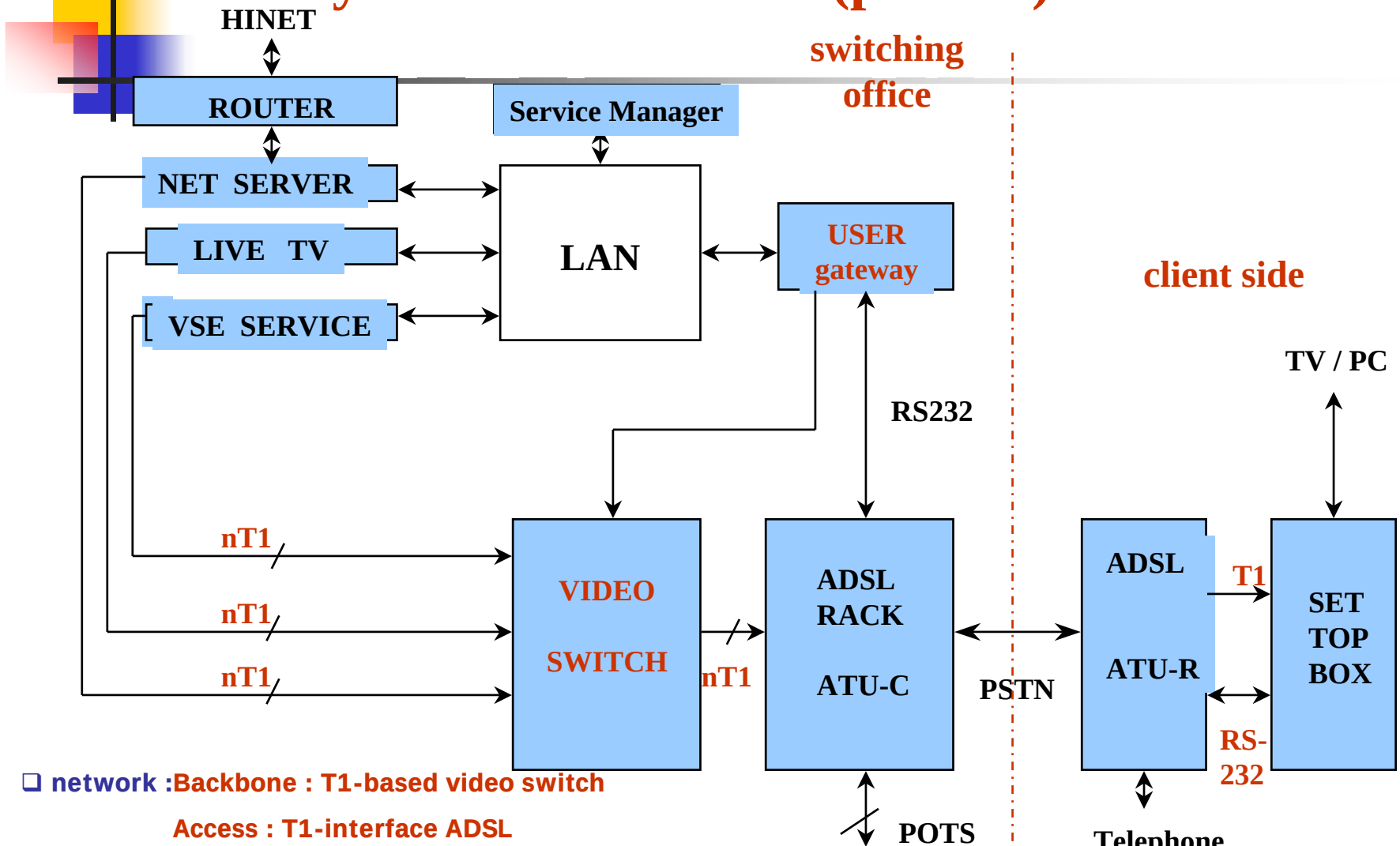
Profiles of CHT MOD service field trials

- First phase of service trial (85/12 ~ 87/06)
  - no. of customers: 28
  - service area: one switching office in the northern Taiwan
  - service interval: from 85/12 to 86/12
  - time of setting up this system: only seven months
  - Provided services
    - (1) NVOD -- 20 channels
    - (2) TV broadcasting - 2 channels
    - (3) high speed data access

- second phase of service trial (87/06 ~ 90/06)
  - Developed by CHT from Jan. 1997; services launched at June 1998
  - Services include:
    - 240 NVOD channel programs
    - 30 true VOD/KOD programs
    - 30 digital live cable TV programs
    - Internet access
  - No. of customers: 400
  - Cover six switching office area

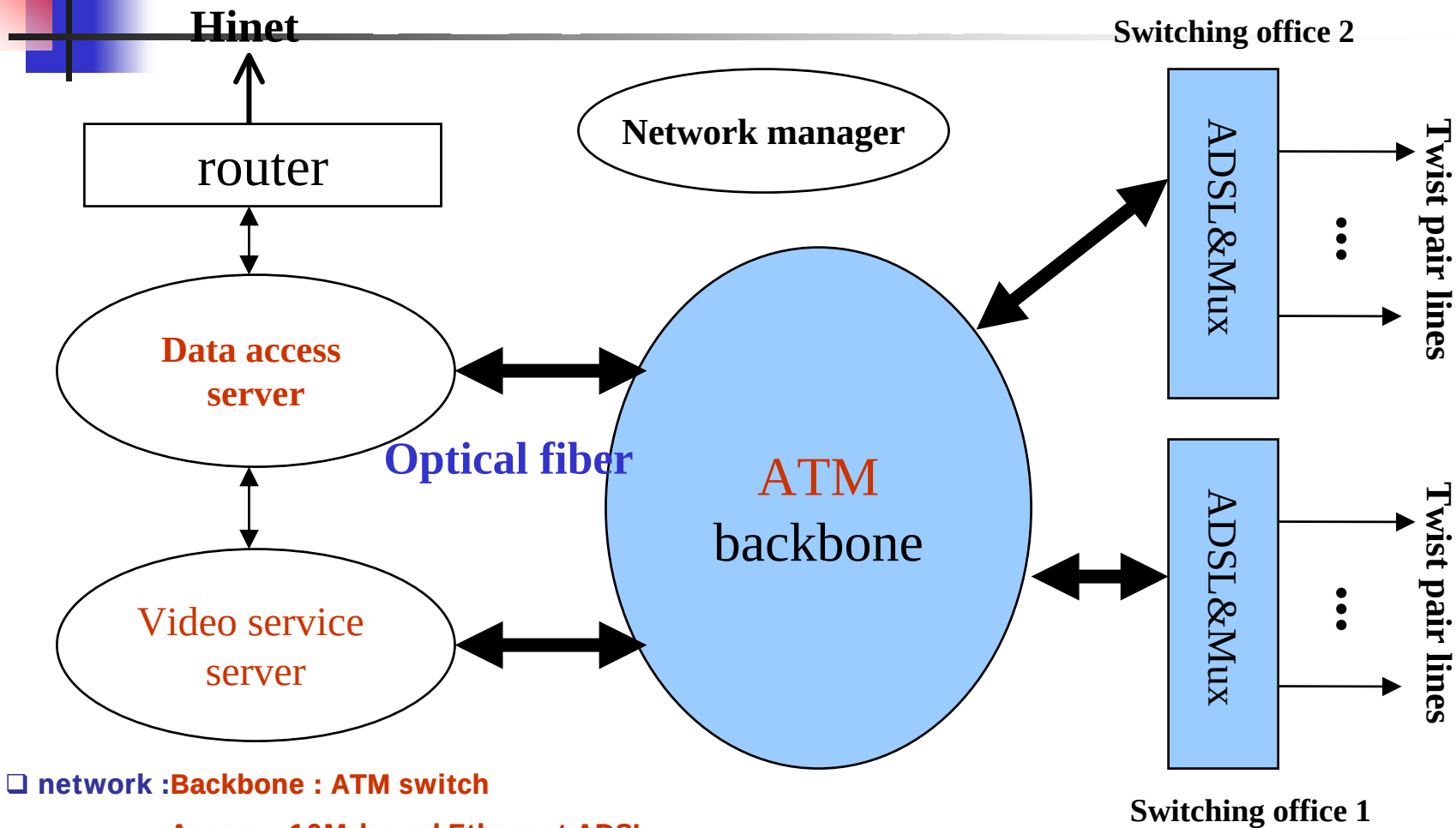
- Commercial service(93/3 ~)
  - # of customers to be: 20,000
  - service area: Keelong and Taipei
  - charged services including basic and pay-per view rate
  - Services
    - movie (on demand and schedule)
    - digital broadcasting TV
    - education program
    - information

MOD System Architecture (phase I)



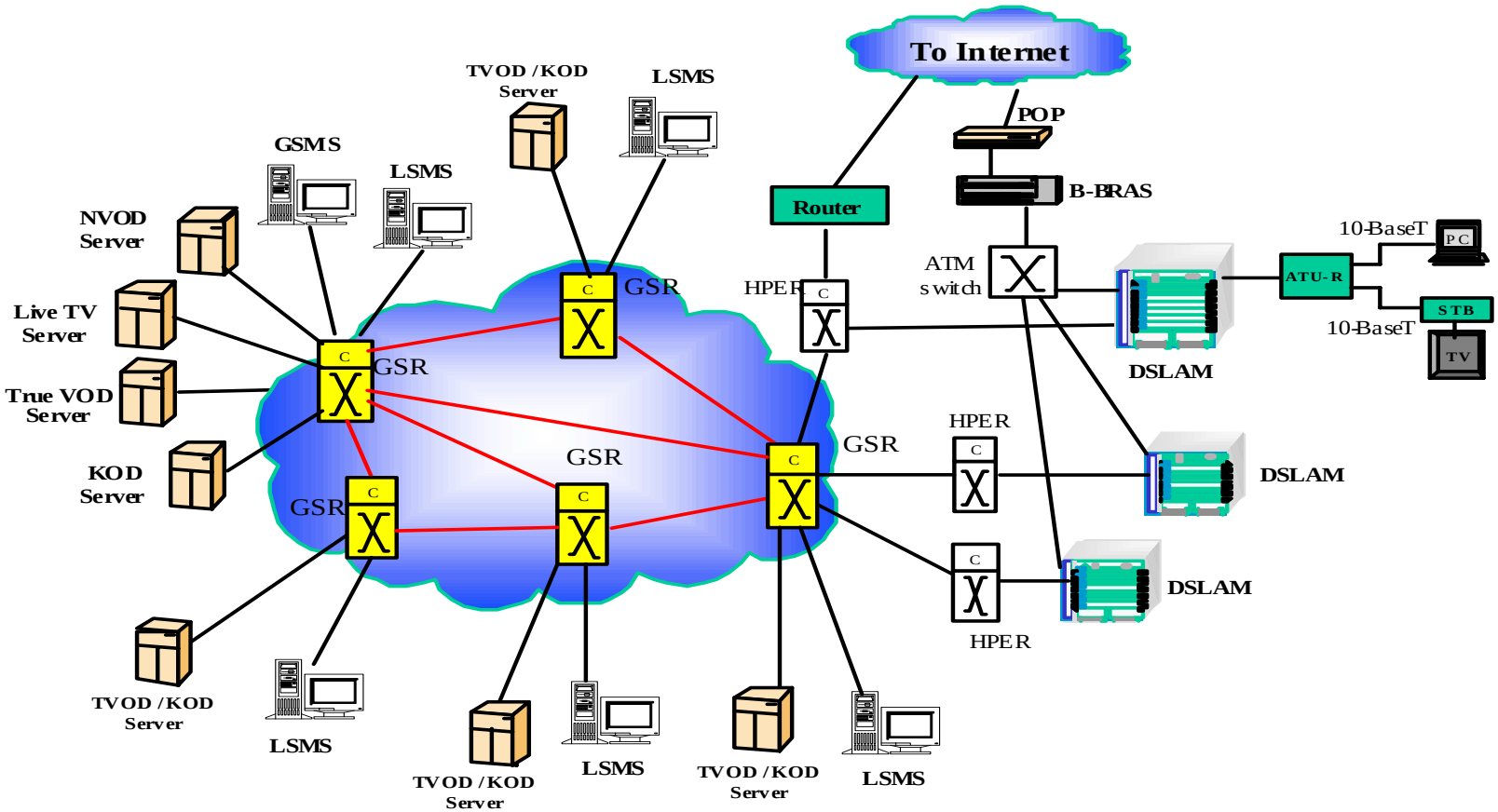
- network :Backbone : T1-based video switch
  Access : T1-interface ADSL
- video server : MPEG1 video pumping server by CHT_TL
- STB : (1) hardware and software designed and manufactured by CHT_TL
  (2) using MPEG1 hardware decoder to decode video streaming
- management system : service and network management by CHT_TL

MOD System Architecture (phase II)



- network :Backbone : ATM switch
  Access : 10M-based Ethernet ADSL
- video server : MPEG1 video pumping server by CHT_TL
- STB : (1) hardware and software designed and manufactured by CHT_TL
  (2) using MPEG1 hardware decoder to decode video streaming
- management system : service and network management developed by CHT_TL

MOD System Architecture (phase III)



- network :Backbone : GSR

  Access : Edge router, IP over ATM ADSL
- video server : MPEG1 / MPEG2 video server
- STB : using MPEG1 / MPEG2 hardware decoder to decode video streaming
- management system : service and network management developed by CHT_TL

CHT MOD Program Guide on TV via STB

TVOD

NVOD

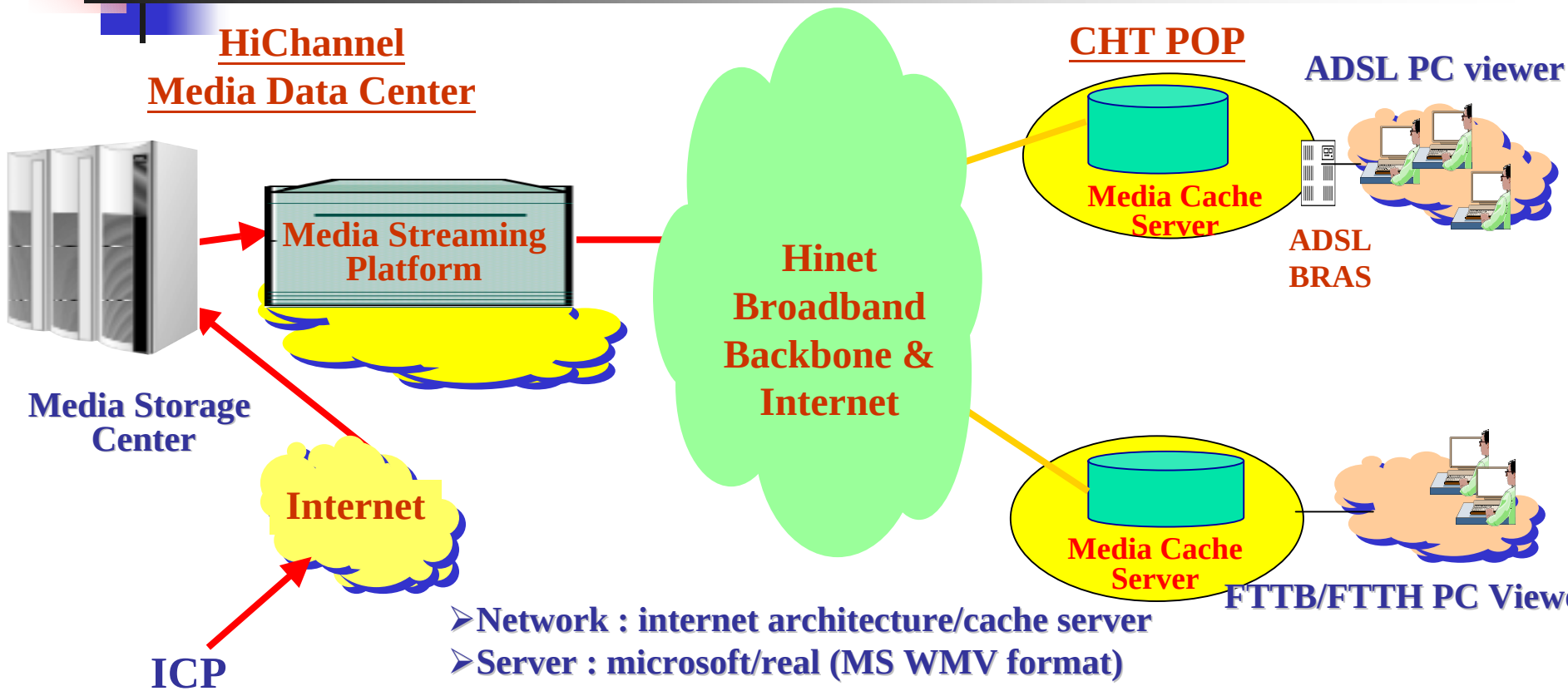
Movie program information

Program Command and Control

movie playing
RTSP controller

movie playing with annotation

HiChannel Service Architecture (PC based VOD)



- Network : internet architecture/cache server
- Server : microsoft/real (MS WMV format)
- Player : microsoft/real and their coding rate depending on network bandwidth
- Management : AAA mechanism
- service area: internet reached area
- Commercial services:
  - . Movie on demand
  - . Broadcast TV on demand

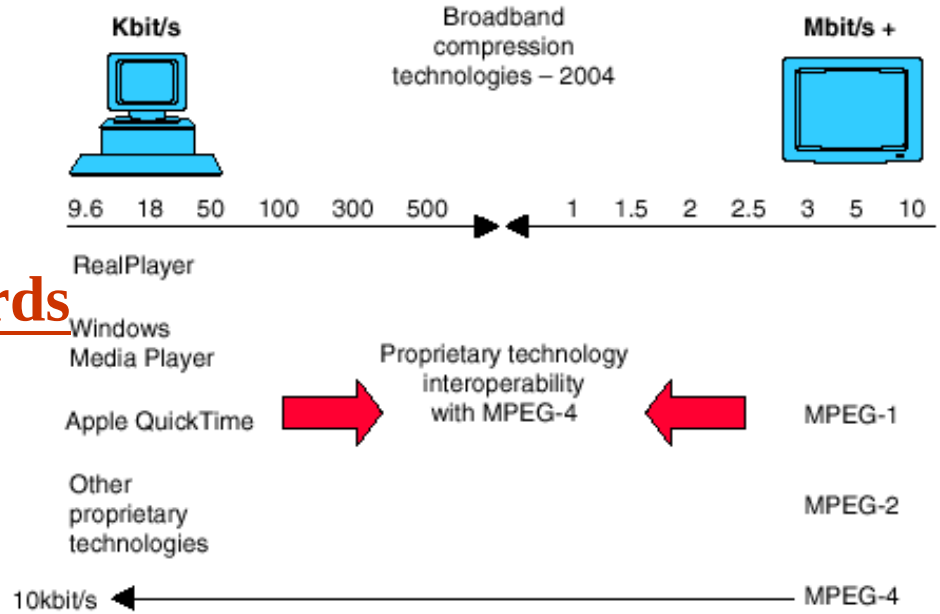
Content

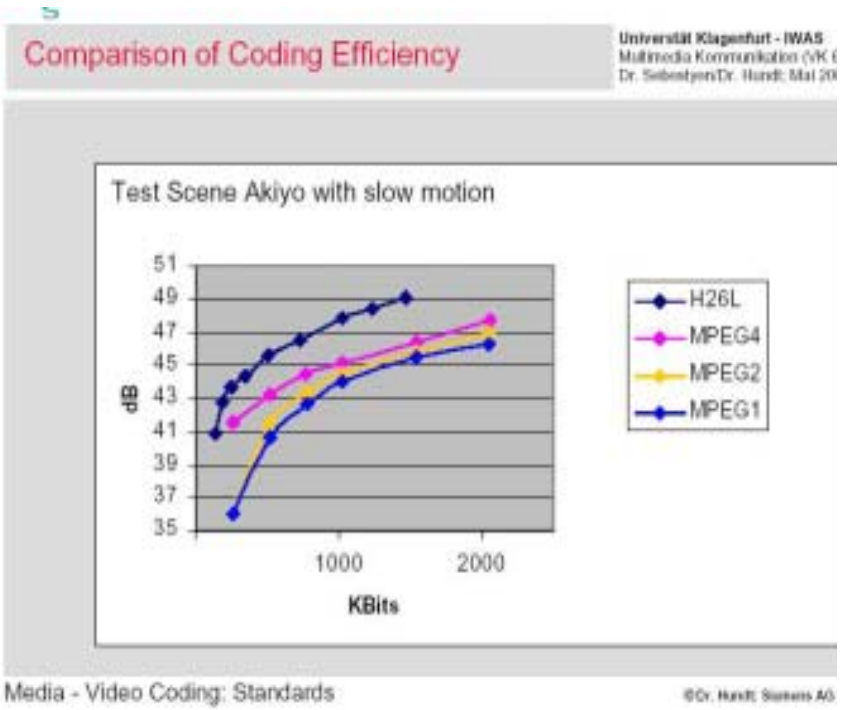
- Triple Play Trend
- CHT's Approach to the Multimedia Services
  - MOD and Hichannel
  - others
- Consideration and Realization of MM Coding Algorithm in CHTTL
- Concluding Remarks

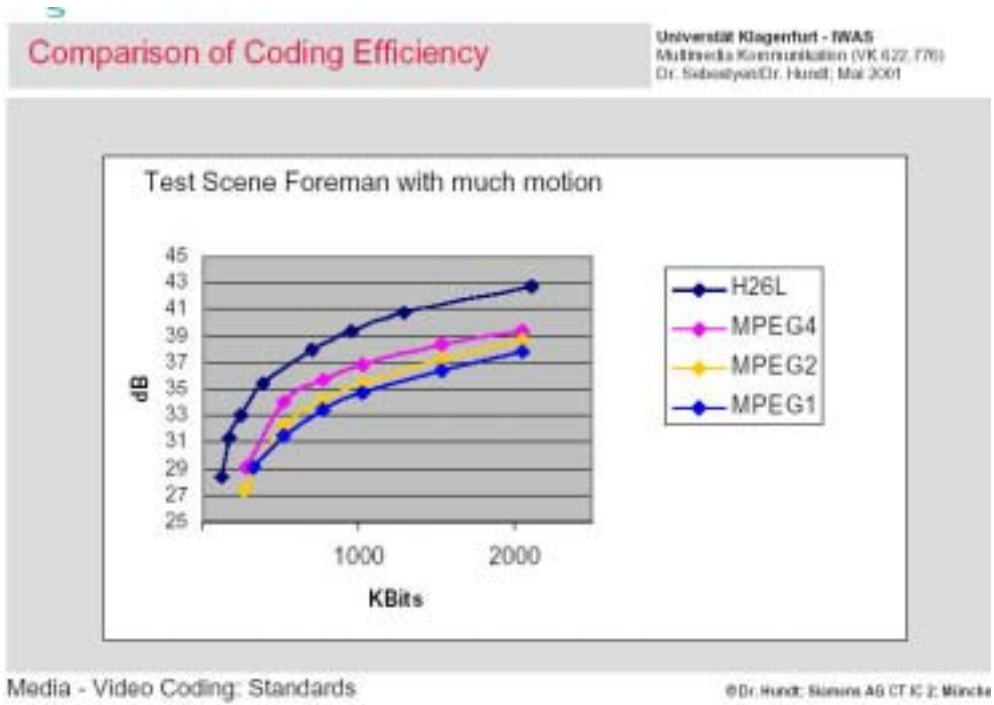
Consideration and Realization of MM Coding Algorithm in CHTTL

- follow the evolution of codec standards
  - HW/SW availability and stability
  - license royalty and the concerns of other stakeholders
- match the Specs. of Services/cost of STB
  - Displaying and controller: TV, LCD TV, PDP TV vs. PC
  - Service video quality requirement
  - Content protection requirement
- Assurance via content preprocessing and Reliable content Delivery and distribution network
- Adopt State of the art video delivery platform

Evolution of Video Codec standards







Issues of A/V coding to deliver MM content

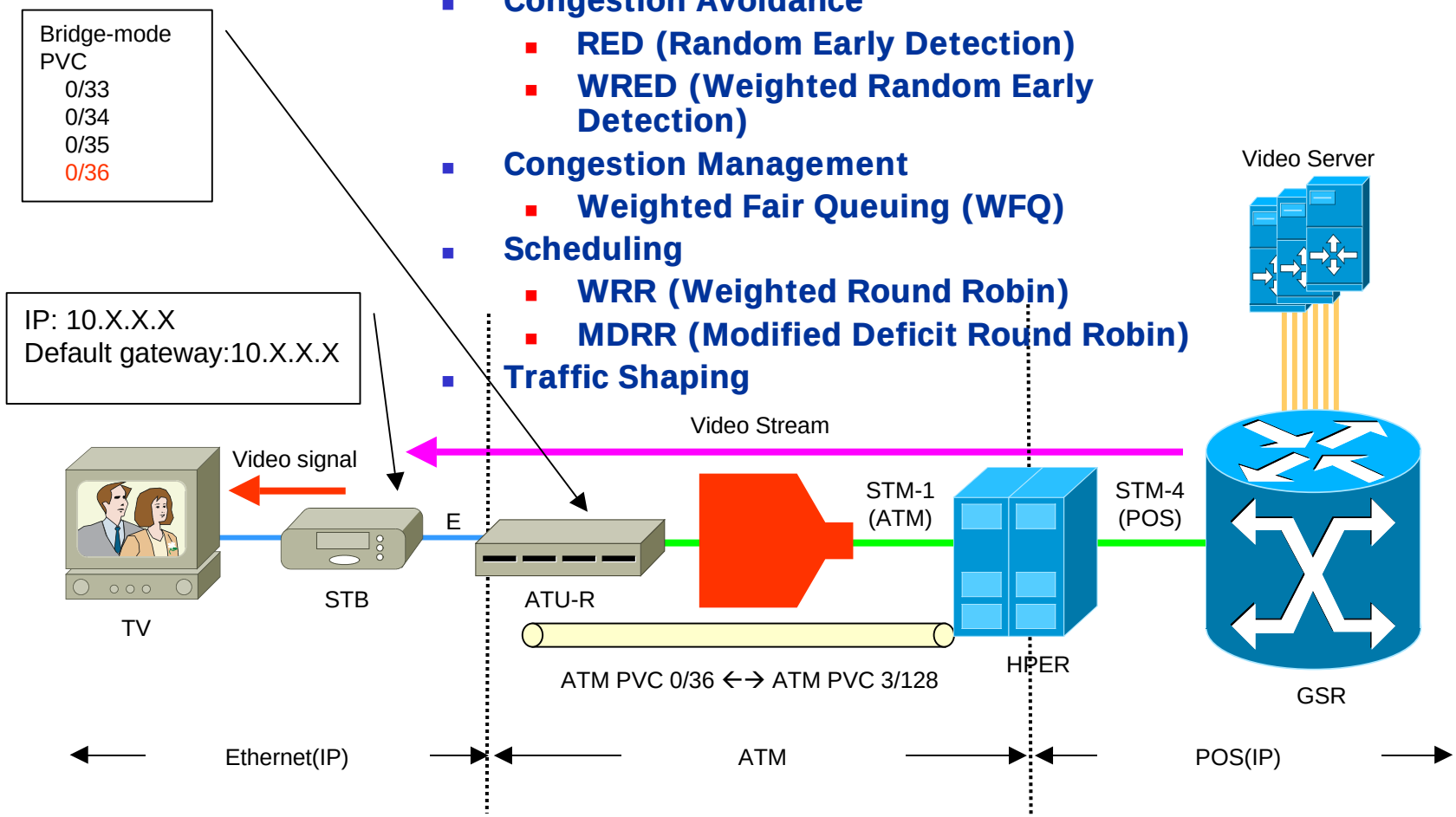
- IP Network issues:
  - video packet delay/jitter - node, CDN
  - bandwidth control for video - managed IP, including so-called CBR, VPN, etc.
- PSTN issues:
  - audio interference - from communication devices, e.g. echo canceller
  - audio interference - from content, e.g. false DTMF
- Content preprocessing:
  - Volume control of Ring back Tone - content normalization
  - audio equalization via different channel delivering - to PSTN or GSM bandwidth
- Interactivity
  - video stream delay/capacity - portal, pumping, multicasting
  - epg, remote control - RTSP, DVB MHP interface, PVR, etc.
  - video, image, audio, flash, game, MMS, etc.
  - Content protection

Experience and Expectation

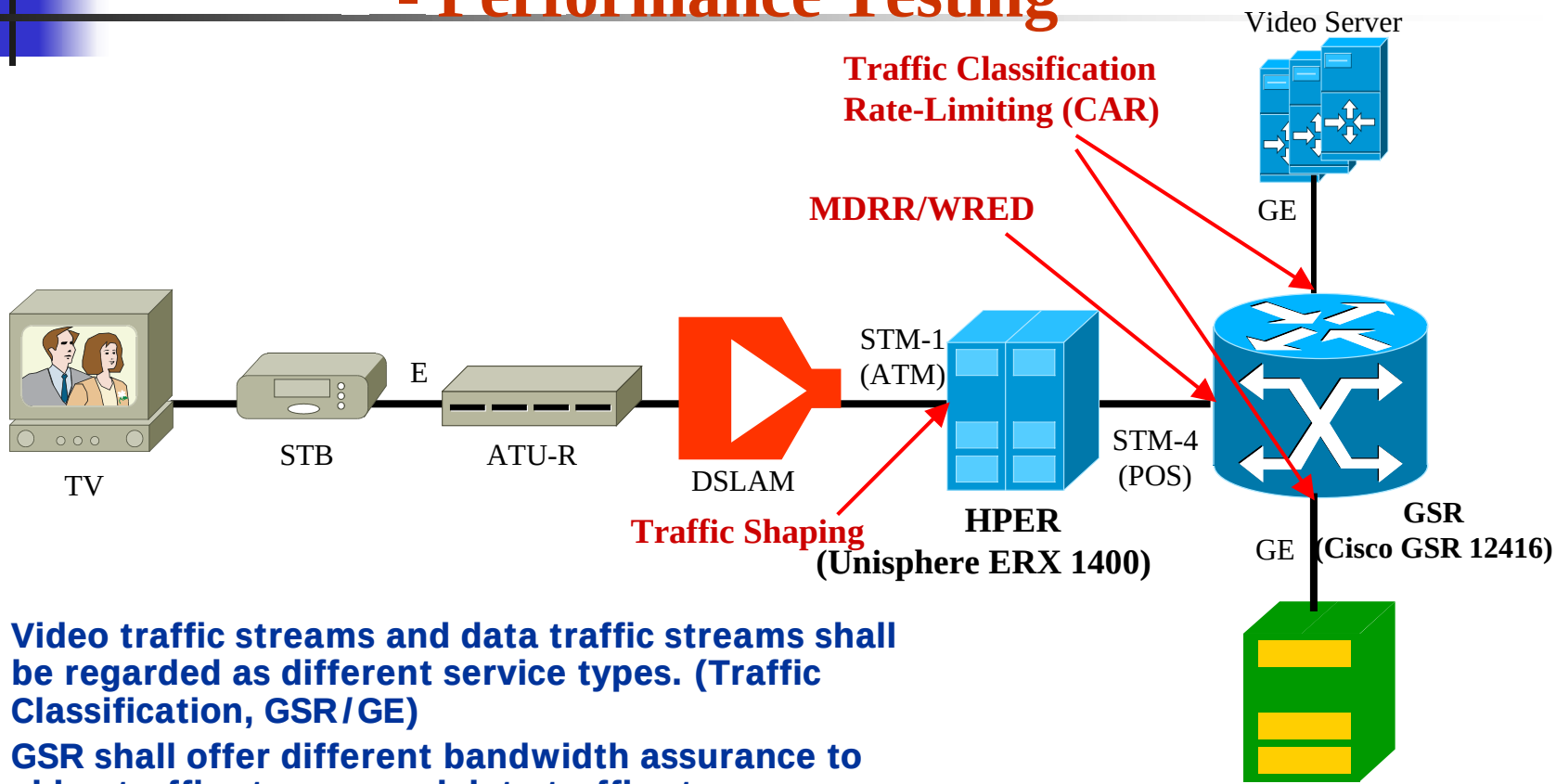
- Mpeg1 program streaming and decoder/STB were implemented in the MOD phase I and II period:
  - Focus on buffer control, synchronization, handshaking, and quality evaluation
  - ADSL pioneering on-site trial during MOD I&II paved the way for the successful CHT massive ADSL deployment in the recent years
  - MOD service was verified to be feasible on CHT network
- Commercial video server and STB product was purchased during commercial release (phase III), CHTTL shifted the effort to functional specification, performance evaluation and assessment, as well as OSS & billing development. Technologically,
  - faster deployment and better reliability was expected
  - interoperable standard and interface was introduced via the multi-vendor involvement and competition
  - In addition to Mpeg2, Mpeg4 SP/ASP/AVC performance and interoperability was also evaluated then
  - Both the Sustainable service package and an affordable STB with flexible functions are still for further exploration
  - friendly DRM/smart card solution plays a must for the emerging multimedia service industry

MOD Service Delivery Quality Assurance

- Committed Access Rate (CAR): Traffic Classification
- Rate-Limiting (Traffic Policing)
- Congestion Avoidance
  - RED (Random Early Detection)
  - WRED (Weighted Random Early Detection)
- Congestion Management
  - Weighted Fair Queuing (WFQ)
- Scheduling
  - WRR (Weighted Round Robin)
  - MDRR (Modified Deficit Round Robin)
- Traffic Shaping

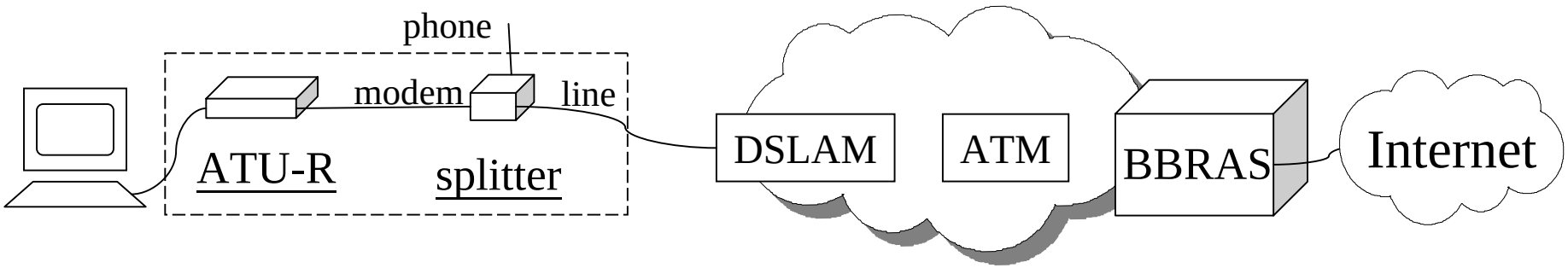


MOD Bandwidth Assurance - Performance Testing



- Video traffic streams and data traffic streams shall be regarded as different service types. (Traffic Classification, GSR/GE)
- GSR shall offer different bandwidth assurance to video traffic streams and data traffic streams respectively. (Rate-Limiting, GSR/GE)
- while Tester(Smartbit6000) pumps low priority data stream to GSR, the video traffic streams quality shall not be downgraded。 (MDRR/WRED, GSR/POS)
- HPER shall offer a constant bandwidth for each subscriber。(Traffic Shaping, HPER/ATM)

ADSL Quality Monitoring

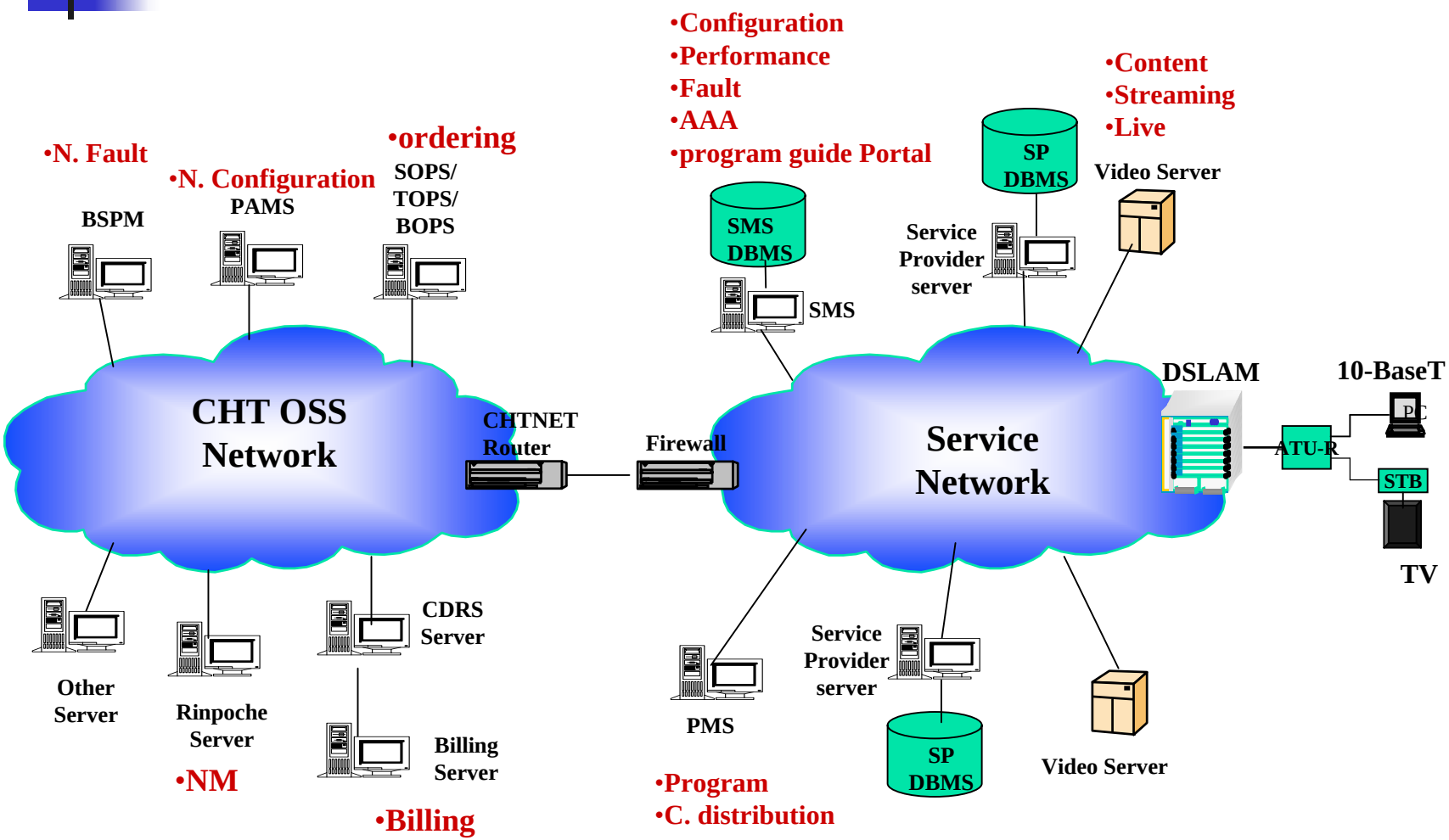


ADSL Service quality:

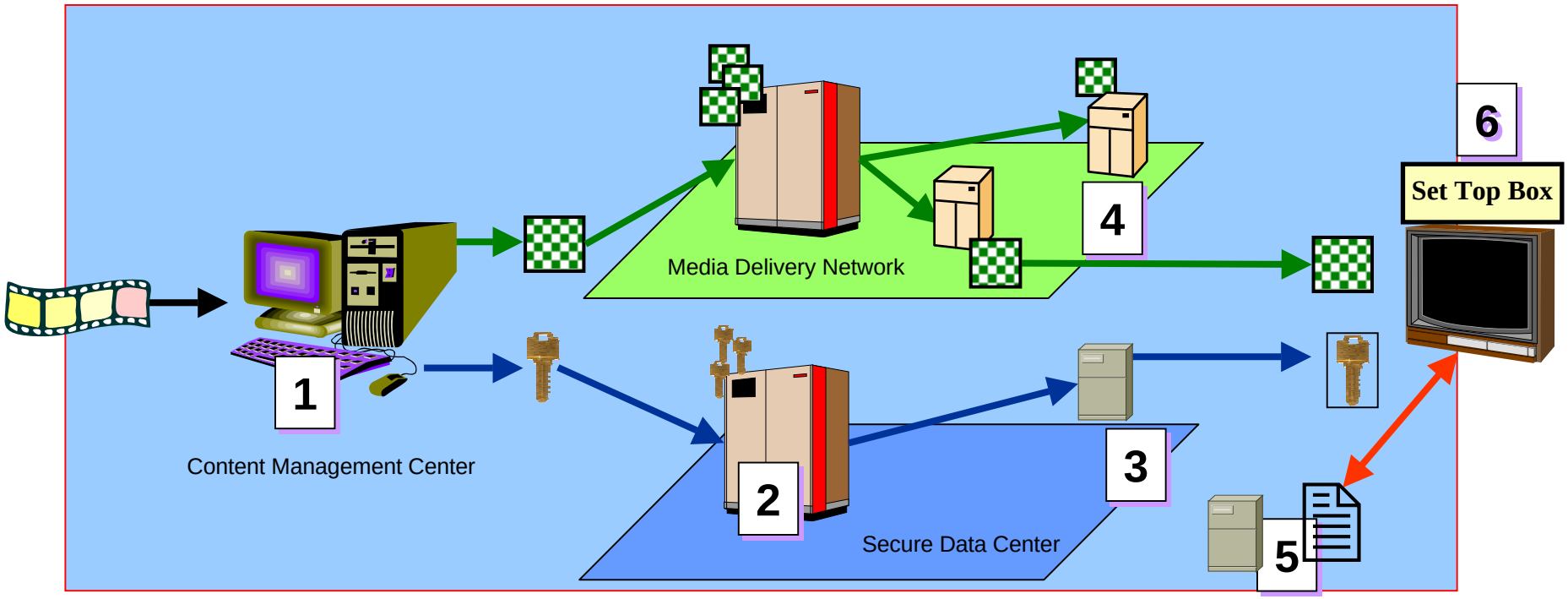
- **Access quality：ATU-R access time, connection time, success rate, BRAS Round Trip Delay、Packet Loss、Jitter**
- **Content response：HiNet Home page download speed, FTP speed**
- **Mail Server availability/Packet Loss, Delay**
- **Other quality parameters: provisioning time, repair time, circuit availability, etc.**

We acted our client's role, tested and evaluated fixed-line voice (local, long haul, oversea, service center), internet access (dialup/ADSL), and mobile GSM (voice and data)

MOD OS/OSS Diagram



MOD Content Security



1. Content Pre-encryption Server
2. Key Storage Server
3. Key Delivery Server
4. Video Server
5. User Authorization Server
6. Secure Client

MOD service management Interface

Other Video Related Studies

- Object extraction R&D in CHTTL
  - video Surveillance: vehicle identification and object based video transmission (MPEG4 over ADSL)
  - photo capturing and background replacement：add-on MM messaging service for CHT MM PublicPhone(via ADSL), and GSM MMS, etc.
  - Trademark figure similarity metrics learning and DB retrieval to assist the government trademark approval process
- Cooperation with universities:
  - Coding - NTU, NCTU, NTHU, US: U. Washington, CMU, Columbia U., U. Wisconsin, ...
  - Content and others - education material, tool & platform, trial, business, etc.

Content

- Triple Play Trend
- CHT's Approach to the Multimedia Services
  - MOD and Hichannel
  - others
- Consideration and Realization of MM Coding Algorithm in CHTTL
- Concluding Remarks

Concluding Remarks

- Market, Revenue and brand name - the hidden hand
  - MM services will inject the new momentum for BB industry and revenue potential while HW & bandwidth prices drop significantly
  - CHT will like to explore the new content based opportunity and cooperate with other stakeholders
- The important factors for a successful IP multimedia industry would be
  - Market driven and customer oriented business model
    - Appealing content pool and accredited services with friendly EPG
    - Effective IP delivery or distribution channel with competitive bandwidth
    - Reliable OSSs and flexible billing for customer diversity and SIG
  - Media: coding standard, licensing policy, content protection (e.g. for PVR), managed IP, and STB cost (from 150 US$ to attractive 50 US$)
  - expected NCC regulation to promote competition and cooperation
- more access bandwidth are expected for CHT IP multimedia services in the living room. (vs. separate voice/e-mail/TV killers)
- Wish H.264 and CHT open platform play the catalyst to a new MM Taiwan

CHT's partnership with you

- Network equipment vendors:
  - Cisco, Unisphere, Nokia, Nortel, SGI, Optibase
- Software/system vendors:
  - Windows media 9, Streaming21, Envivio
  - e-learning ASP (BVS): e-wave21
  - VOD middleware: ORCA, 華電, 華智
  - content integration：愛爾達
- CPE vendor:
  - 傳訊王，Pace, Ambit
- Art and content providers: (MOD)
  - 因思銳八大電影影劇、
  - 惠聚多媒體提供的卡拉OK點播 、
  - 飛遠旅遊、宏碁遊戲、精業財經資訊
- Universities ...
- Win-win Partnership:
  - Support CHT's content, platform, tools, …
  - CHT Supports ICPs (revenue sharing)
    - storage, platform, customer-care, payment/billing, marketing, location, security, brand, customer base, …

Thank you for your Participation!