



Internet Multimedia Service in CHT's HiNet

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Agenda



- ❑ Overview
- ❑ Global Multimedia Market
- ❑ Multimedia Technologies
- ❑ Multimedia Services in HiNet
- ❑ Summary



Overview



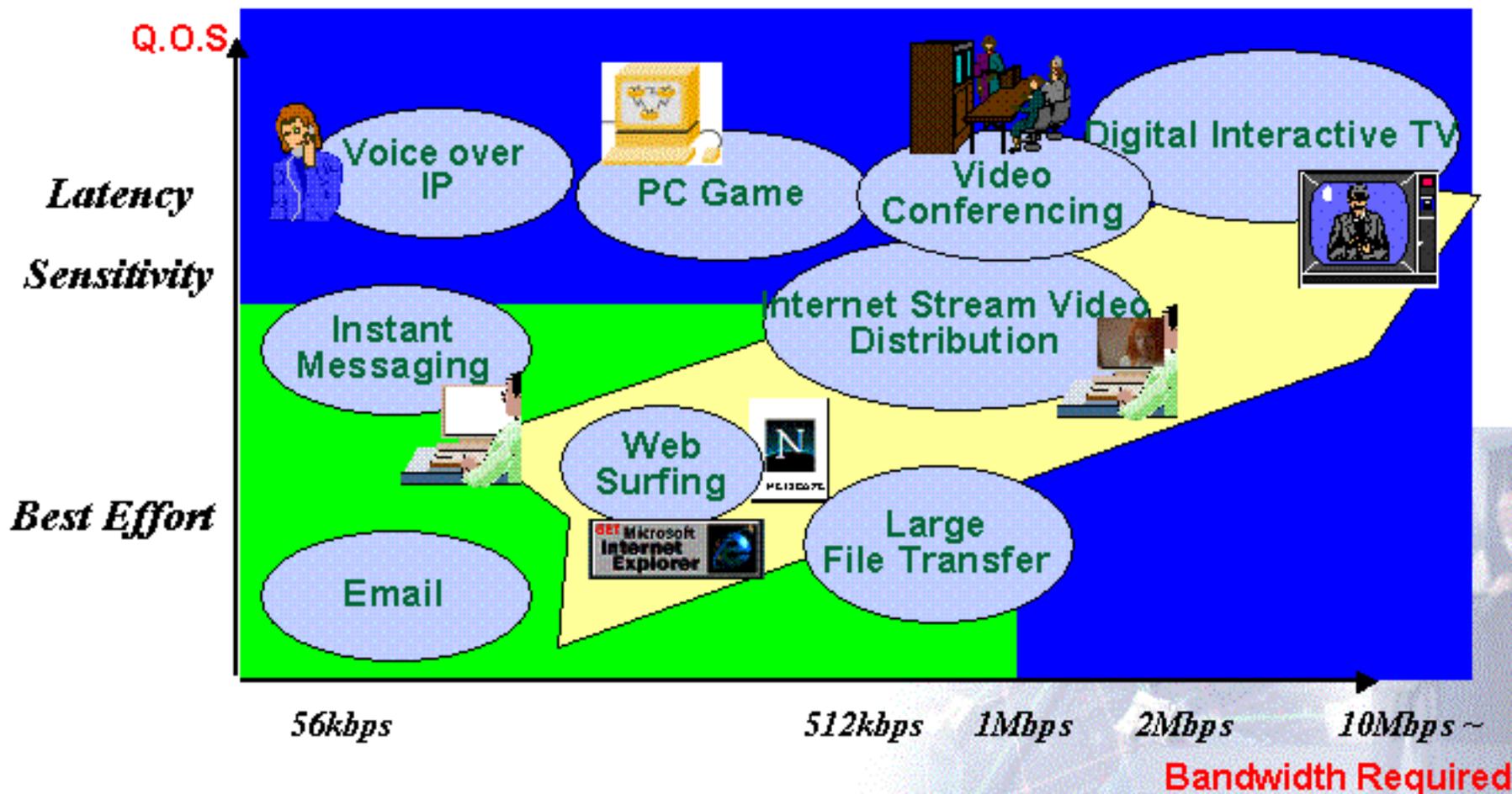
- ❑ In June 2002, Jupiter Research study shows that 70% users in USA are willing to pay for Internet multimedia contents (video, music and game)**
- ❑ Multimedia services are growing fast due to the development of broadband access, video coding technology, content protection mechanism etc.**
- ❑ As of Jan. 2004, broadband user has reached 3.3M in Taiwan, the penetration is 51.15% in terms of household**
- ❑ Multimedia services have become focus business after the popularity of Broadband in Taiwan**



Demand for Internet Multimedia



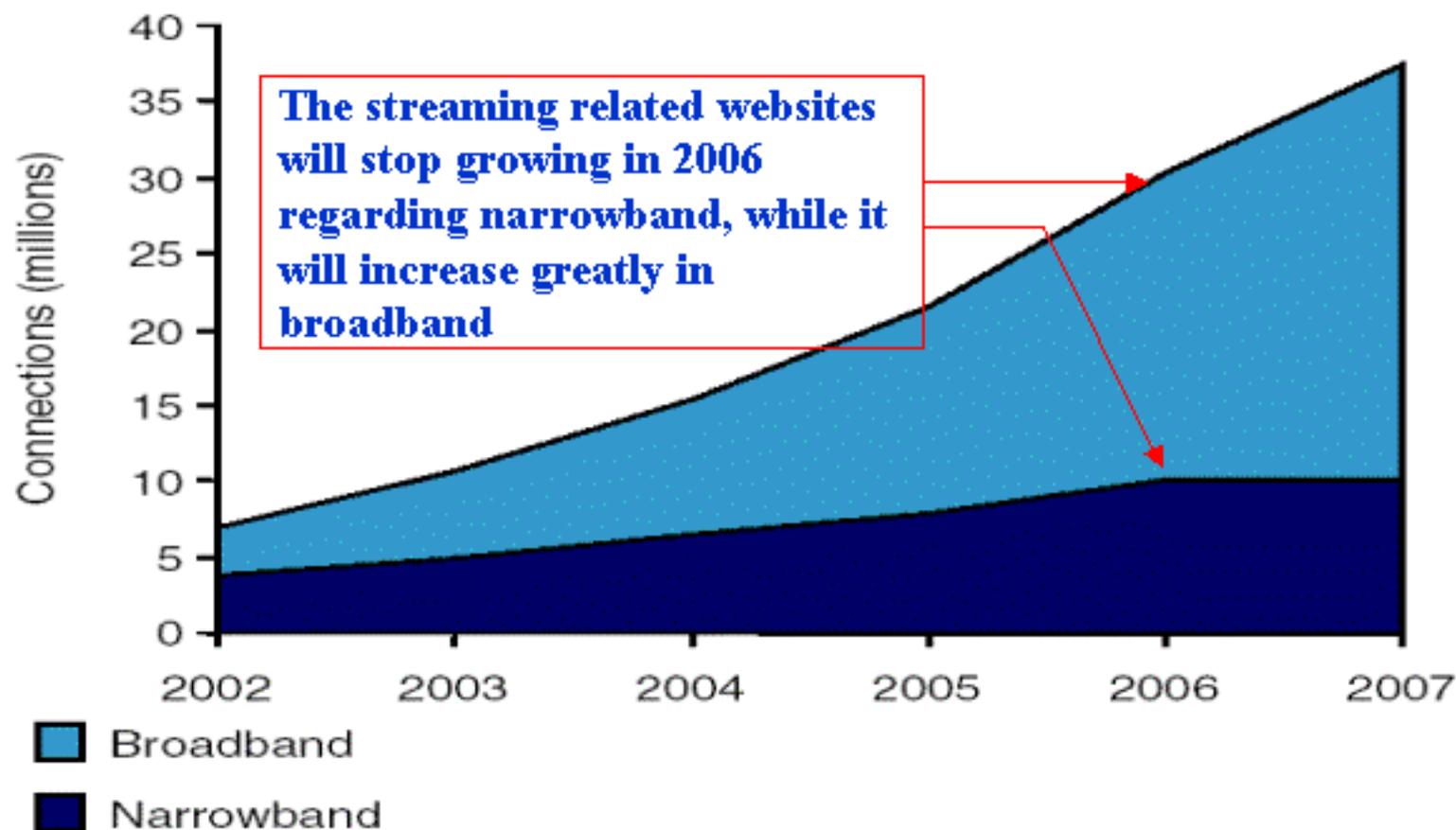
❑ Multimedia service requires broadband access and higher quality



Growth of Streaming Related Websites



Broadband and narrowband business streaming connections



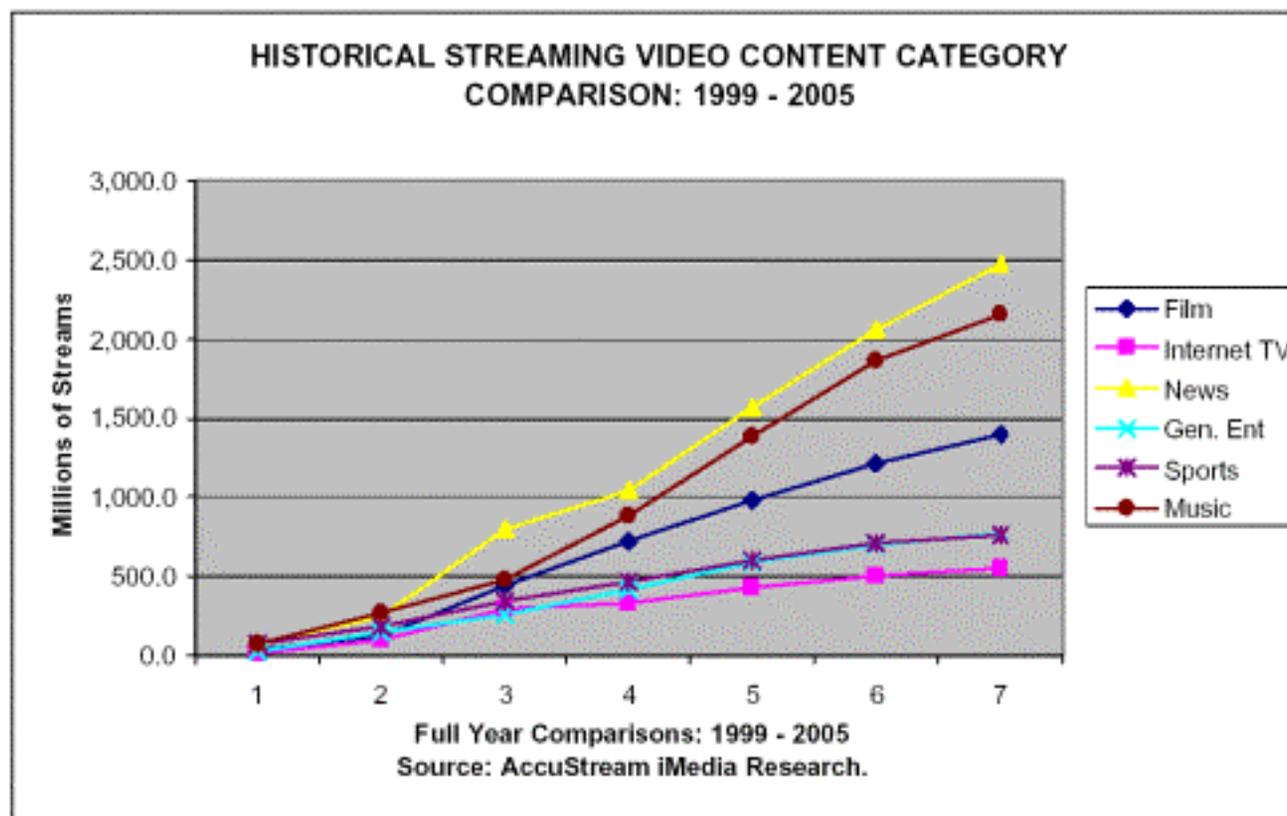
Source: Ovum (Ovum Forecasts: Global IP and Broadband Markets/Chapter E)

Growth of Streaming Contents



- Almost all content categories forecast at 2 digits growth rate through 2005

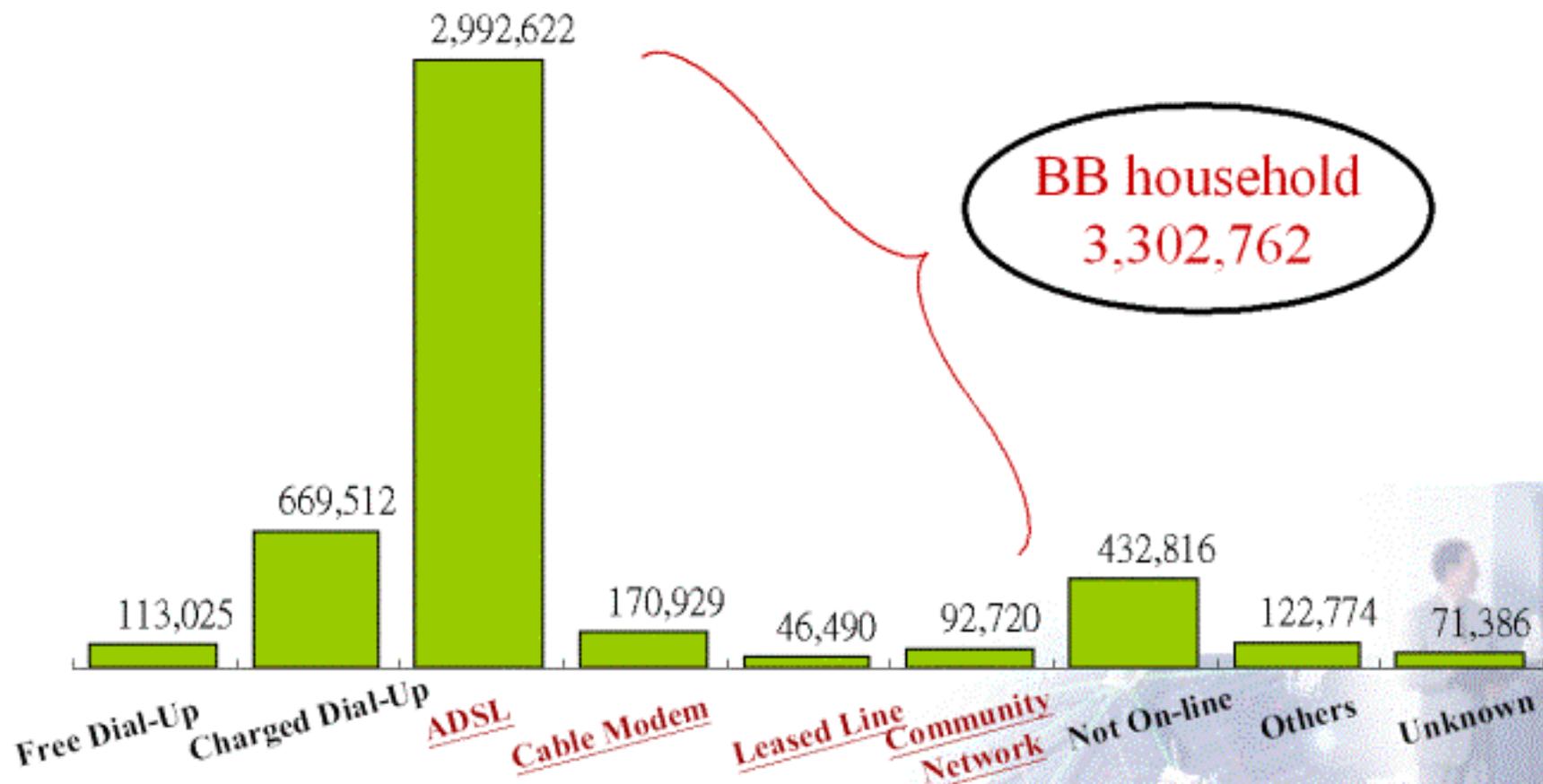
Source: AccuStream iMedia Research.



Broadband Household in Taiwan



Source: TWNIC 2004/02



☐ Reached 3.3M in Taiwan, the penetration is 51.15% in terms of household





Growth of Streaming Websites in Taiwan

Business streaming connections by country, 000s

	2002	2003	2004	2005	2006	2007
Asia-Pacific	879	1,471	2,307	3,367	4,771	6,080
Australia	118	179	273	385	515	615
Indonesia	5	10	16	33	71	130
Japan	564	958	1,478	2,102	2,847	3,425
Malaysia	6	16	28	53	143	297
New Zealand	7	14	23	38	67	95
Philippines	0	1	3	8	18	39
Singapore	24	33	52	77	105	125
South Korea	92	160	257	381	534	667
Taiwan	51	80	140	222	326	412
Thailand	3	6	13	29	82	184
Vietnam	0	1	2	6	15	31
Rest of Asia-Pacific	9	15	23	33	47	60

Source: IP-Services@Ovum

- ❑ **Multimedia streaming related websites will increase significantly in Taiwan during these years**



Global Multimedia Market

Multimedia Market in Japan



Total Broadband Applications Market: Revenues by Application Type (Japan), 2001-2005

Applications	2001 (\$Million)	2002 (\$Million)	2003 (\$Million)	2004 (\$Million)	2005 (\$Million)
Online gaming	1.56	9.33	16.60	25.84	32.60
VOD	0.95	1.30	2.00	5.36	9.75
Music	0.55	1.06	2.00	3.50	5.00
Education	9.20	16.17	24.95	33.60	41.30
VoIP	76.45	111.43	165.32	191.21	215.21
Others	0.90	2.50	4.00	5.93	7.62

Note: All figures are rounded; the base year is 2001. Source: Frost & Sullivan

- All categories of services are growing
- Major applications are VOIP, Education and Online gaming
- Note: Only apply to services of DSL & Cable Modem, not include wireless & satellite.

Multimedia Market in Korea



Broadband Applications Market: Revenues by Application Type (South Korea), 2000-2004

Applications	2000 (\$Million)	2001 (\$Million)	2002 (\$Million)	2003 (\$Million)	2004 (\$Million)
Online Gaming	92.3	176.0	298.8	368.8	413.4
Movie on Demand	2.0	10.0	32.5	48.7	57.7
Online Shopping	412.0	981.0	1,876.7	2,649.8	3,156.0
Online Broadcasting	22.0	60.0	102.9	133.6	156.9
Online Music	0.1	1.0	4.3	8.1	9.8
Online Finance	1,692.0	2,069.0	2,381.4	2,593.4	2,777.5
E-Learning	8.0	43.0	109.0	197.8	256.8
Online Chatting Community	3.0	19.0	33.3	38.3	41.2
Internet Telephony	103.0	219.1	333.6	438.9	542.2

Source: Frost & Sullivan

1 : Only apply to DSL & Cable modem.

2 : All categories of services are growing.

3 : Major services are Online Shopping, Online Finance and Internet Telephony.



Multimedia Market in Hong Kong



Total Broadband Applications Market: Revenues by Application Type (Hong Kong), 2001-2005

Applications	2001 (\$Million)	2002 (\$Million)	2003 (\$Million)	2004 (\$Million)	2005 (\$Million)
Online gaming	1.93	5.27	7.65	10.20	12.95
VOD	0.09	0.18	0.39	0.72	1.30
Music	0.03	0.10	0.21	0.32	0.45
Education	2.47	4.75	8.95	14.00	19.60
VoIP	3.15	7.35	15.12	25.10	32.89
Others	0.10	0.19	0.33	0.40	1.40

Note: All figures are rounded; the base year is 2001. Source: Frost & Sullivan

- Major services are VOIP, Education & Online gaming



Multimedia Market in Singapore



Total Broadband Applications Market: Revenues by Application Type (Singapore), 2001-2005

Applications	2001 (\$Million)	2002 (\$Million)	2003 (\$Million)	2004 (\$Million)	2005 (\$Million)
Online gaming	1.02	2.66	4.66	7.05	9.20
VOD	0.00	0.26	0.48	0.81	1.00
Music	0.05	0.15	0.28	0.40	0.50
Education	4.00	7.56	11.56	15.56	18.23
VoIP	2.30	3.10	4.40	7.90	12.00
Others	0.96	0.31	0.49	0.79	2.10

Note: All figures are rounded; the base year is 2001. Source: Frost & Sullivan

- Major services are Education, VOIP & Online game



Multimedia Market in Taiwan



Total Broadband Applications Market: Revenues by Application Type (Taiwan), 2001-2005

Applications	2001 (\$Million)	2002 (\$Million)	2003 (\$Million)	2004 (\$Million)	2005 (\$Million)
Online gaming	36.00	79.00	137.00	200.30	261.98
VOD	1.10	2.35	3.00	3.61	4.13
Music	0.15	0.82	1.76	2.60	3.50
Education	2.22	4.50	7.85	10.25	11.30
VoIP	0.12	3.80	13.80	21.10	26.00
Others	0.20	0.30	0.31	0.75	2.20

Note: All figures are rounded; the base year is 2001. Source: Frost & Sullivan

- Major services are Online gaming, VOIP & Education.



Multimedia Technologies

Video Coding

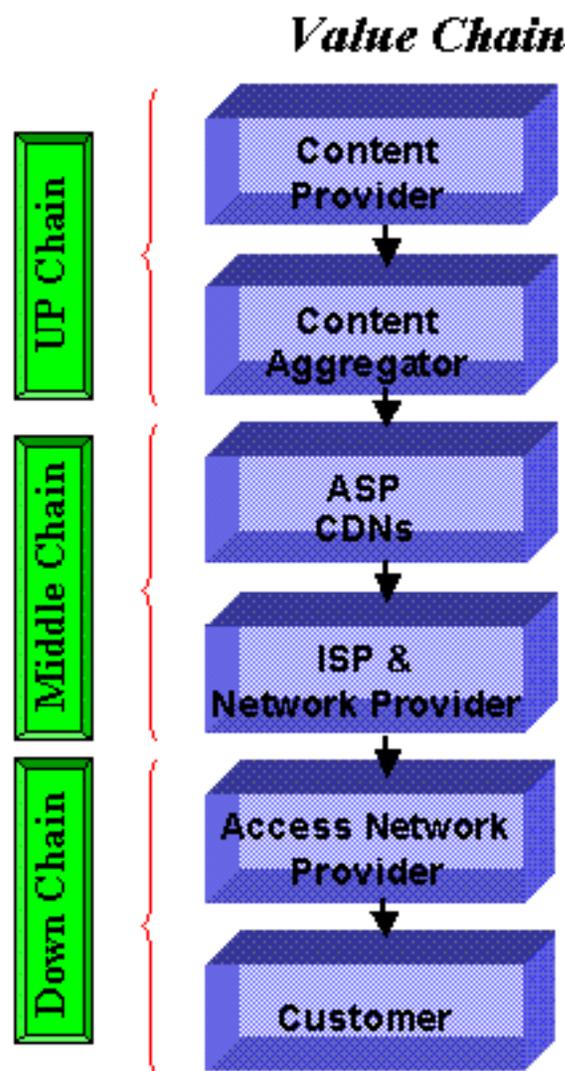
DRM

Streaming

CDN



Key issues for Multimedia Service



Content is king!

- Attract Customer
- Profitable Business

How to Get Content?

- Capability to deliver high quality content

✓ Advance Video Coding

✓ Streaming System

✓ CDN

✓ COS/QOS Network

- Trustable Content Protection

✓ DRM

- Large Customer Base



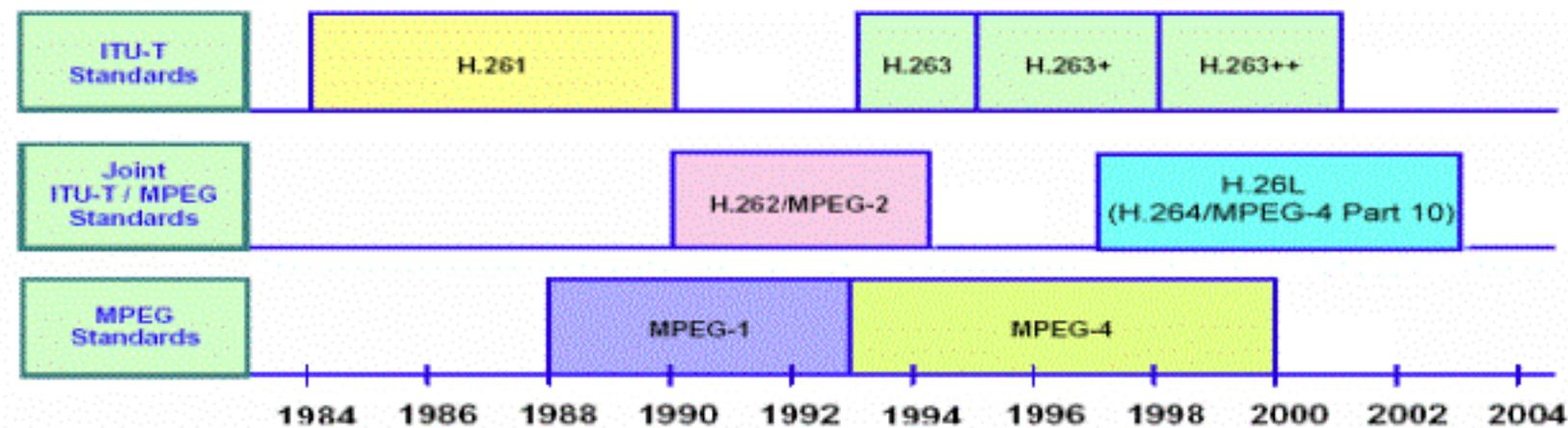
Video Coding Technologies (1/3)



□ Two families of standards

- ITU-T: H.26x (e.g., H.261, H.262, H.263, and H.26L)
- ISO/IEC JTC1: MPEG-x (e.g., MPEG-1, MPEG-2, and MPEG-4)

□ Progression of video coding standards



Video Coding Technologies (2/3)



□ MPEG-1

- For VCD
- Transmission Rate: 1.5Mbps

□ MPEG-2

- For Digital TV broadcasting and DVD
- Transmission Rate: at least 4Mbps

□ MPEG4-1 (SP)

- High compression factor
- Target at low rate applications (28-144Kbps)

□ MPEG4-2 (ASP: Advanced Simple Profile)

- Target at mid rate applications (144K-2Mbps)
- About 40% bit rate saving compare with MPEG-2



Video Coding Technologies (3/3)



□ MPEG4-10/H264

- Target at all bit rates
- High compression factor & coding complexity
- H264 is more focus on digital TV

□ WM9

- A private compression algorithm owned by Microsoft
- MPEG-4 compression algorithm belong to public domain
- According to Microsoft evaluation, WM9 is superior to MPEG4 in coding efficiency, picture performance and power consumption
- WM9 can only play on Microsoft Media Player

Digital Rights Management (DRM)



❑ Purpose of DRM

- Protection of digital content copy rights
 - Identify and describe intellectual property
 - Set the rules under which it can be used
- management of rights level
 - Secure the content and enforce the usage rules by rights owner or policy makers

❑ Major functions of DRM system

- Management of rights to digital contents
- Constraint to authorized users and use
- Management of consequences of use throughout the entire life cycle of the content



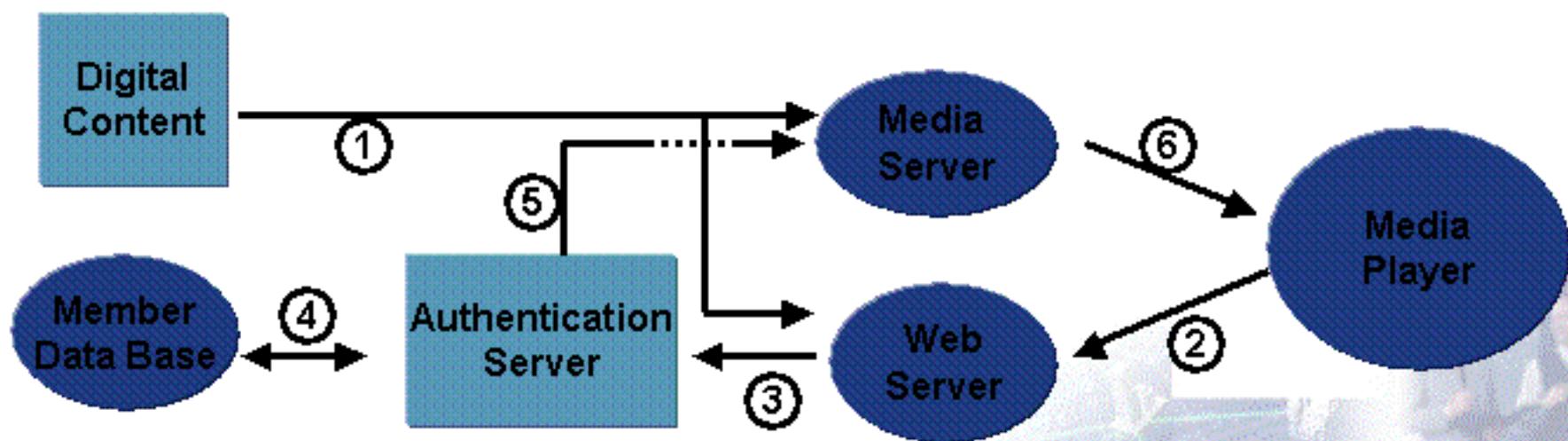
Content Protection Mechanisms



❑ Conditional access system

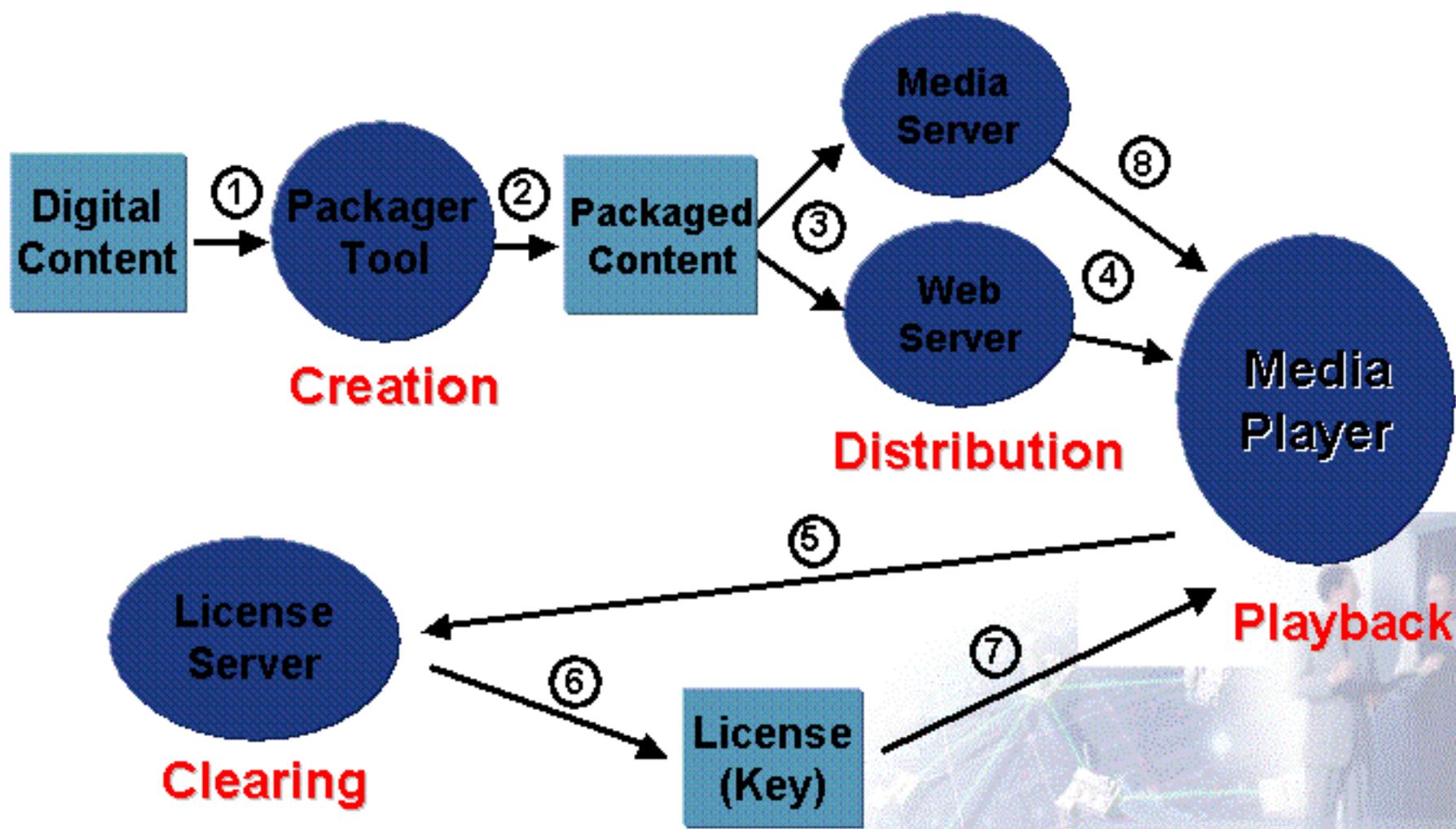
- ✓ To certify the subscriber privilege for retrieving the content

❑ Encrypt digital content system

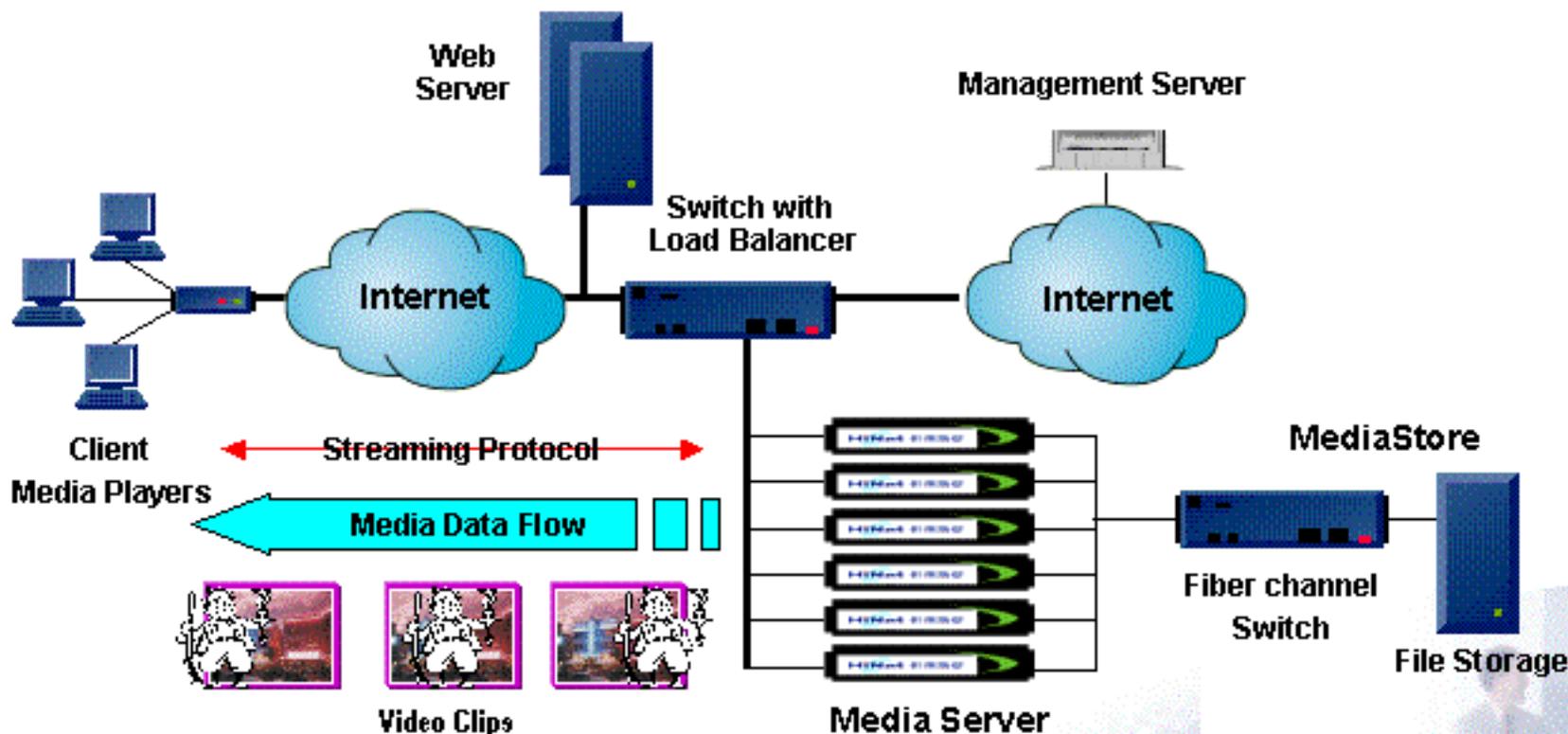


Conditional Access Mechanism

Process Flow of Encrypt Digital Content



Streaming System (1/2)



- ❑ To avoid delay for playing audio or video over Internet due to download entire file firstly
- ❑ Client requires fast connection and powerful computing to execute decompression in real time.

Streaming System(2/2)



Tree Major Streaming Systems

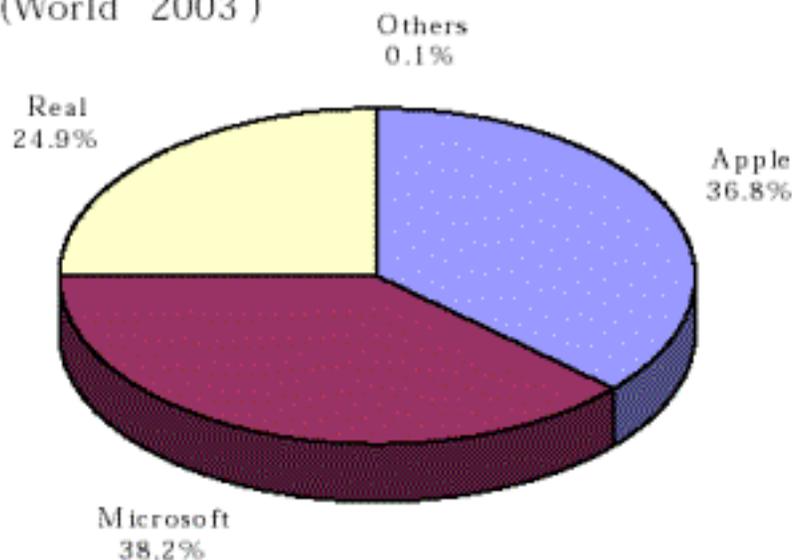
	Real Networks	Microsoft	Apple
System	Helix Universal Server	Windows Media 9 Series	QuickTime Streaming Server 5
Operating System	<ul style="list-style-type: none">● Windows● Linux● Macintosh● Solaris	<ul style="list-style-type: none">● Windows	<ul style="list-style-type: none">● Windows● Macintosh
Streaming Protocol (RTSP)	Support	<ul style="list-style-type: none">● WMS9 Support● WMS4.1 Support MMS	Support
Markup Language (SMIL)	Support	<ul style="list-style-type: none">● WMS9 Support● WMS4.1 By Browser	Support
DRM	Real DEM	Microsoft DRM	3rd Party Solution
Multicast Support	Support	Support	Support
License Fee	Count By User License	Bundle Windows Server 2003	Pay for Server



Streaming System Trend

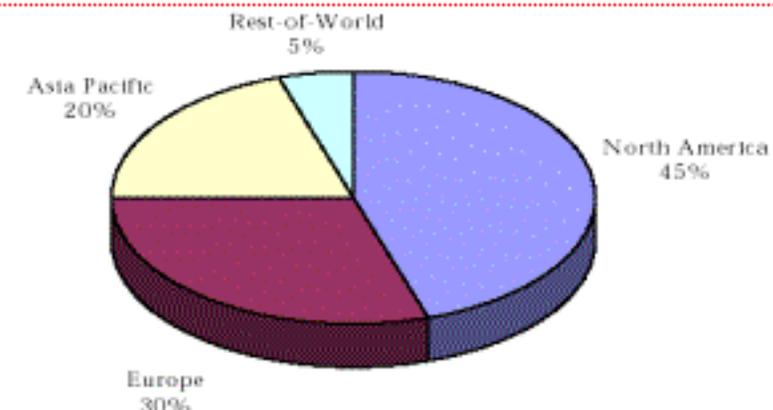


Media Streaming Platform Market Share of Major Market Participants (World 2003)



Note: All figures are rounded. Source: Frost & Sullivan

□ Asia Pacific is expected to grow dramatically



Media Streaming Platform Market 2003



Media Streaming Platform Market 2010

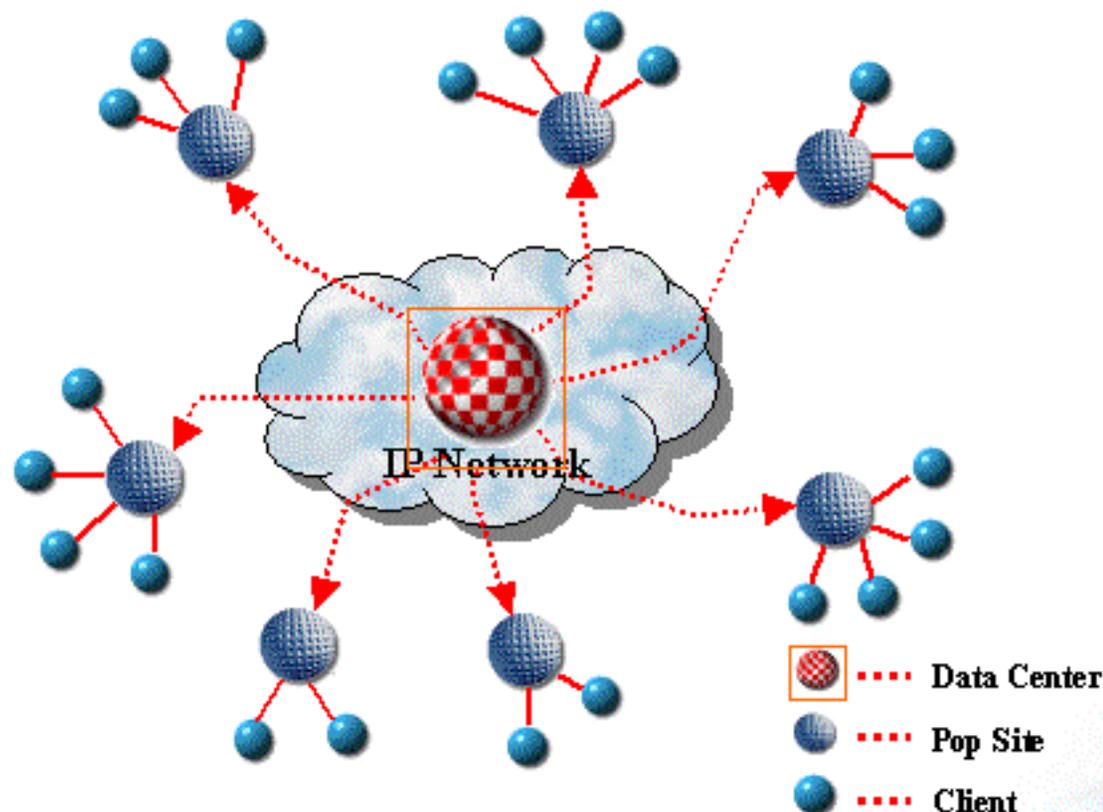
Percent of Revenues by Geographic Region



Content Delivery Network (CDN)



What's CDN?



- To distribute content service and deliver to client from the nearest site

Why CDN?

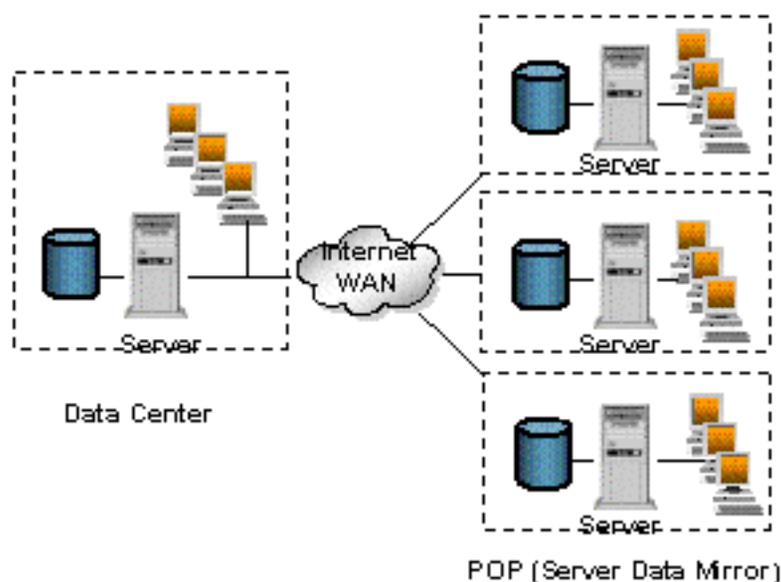


- To resolve above issues on content retrieve

CDN Technologies



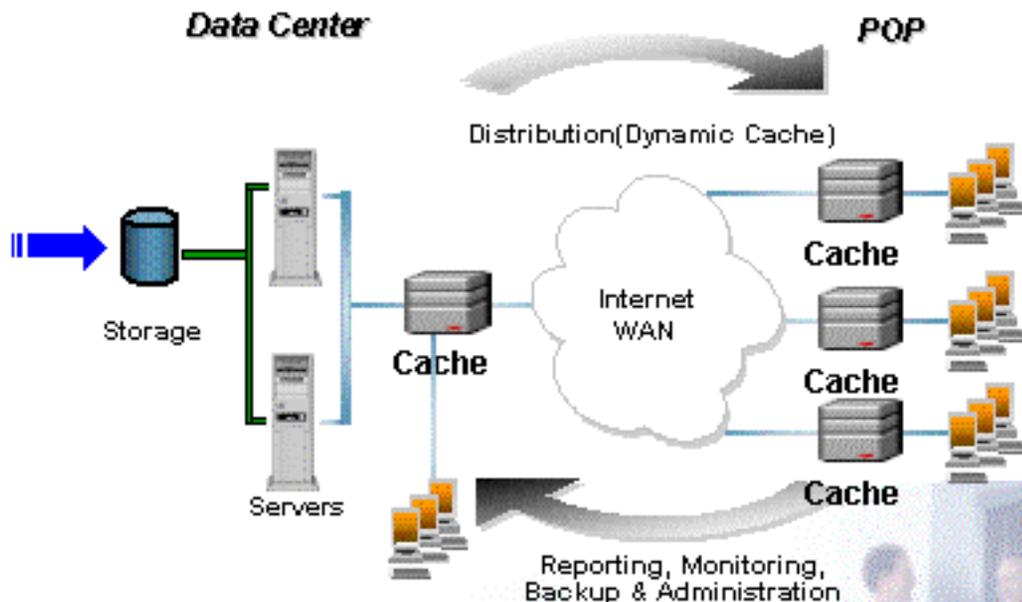
The current Solution of HiNet CDN



Server Base CDN

Advantage : Flexible for Interoperability

Disadvantage: 1. Complicated System
2. Higher Operating Cost

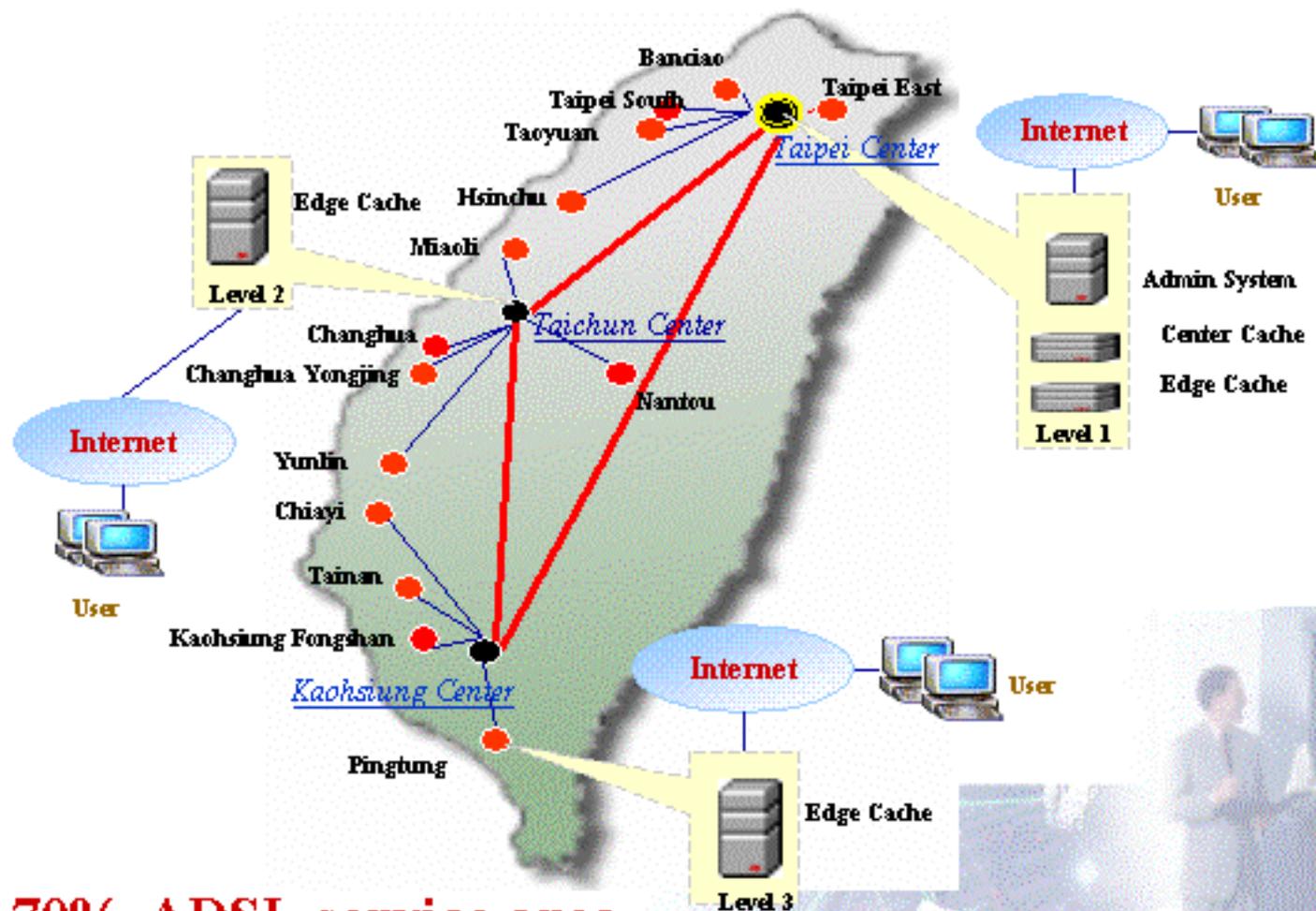


Cache Base CDN

Advantage : 1. Easy to Management
2. Lower Operating Cost

Disadvantage : Original server compatible issues

HiNet CDN



☞ Cover +70% ADSL service area

☞ Total 18 sites for whole island, still expanding



Multimedia Services in HiNet

hiGame

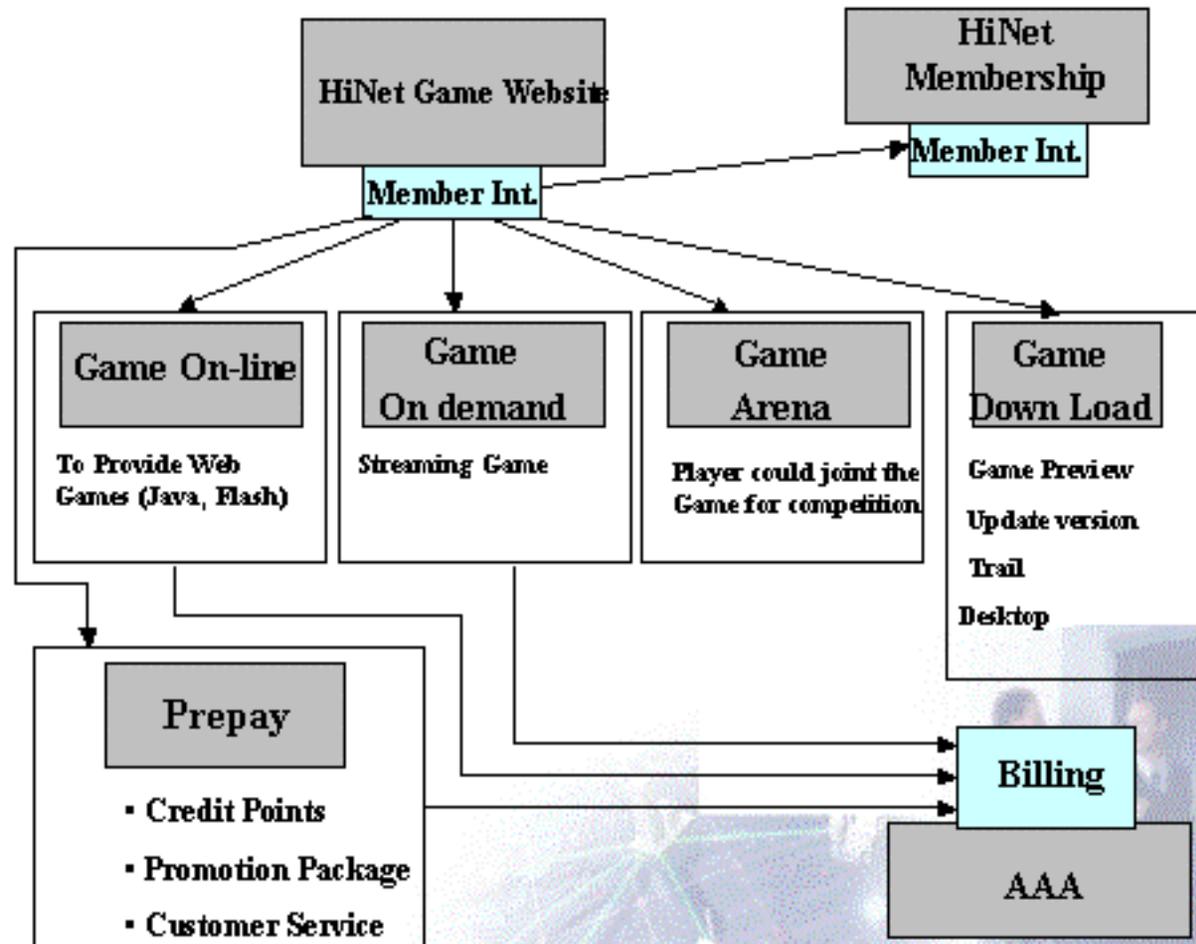
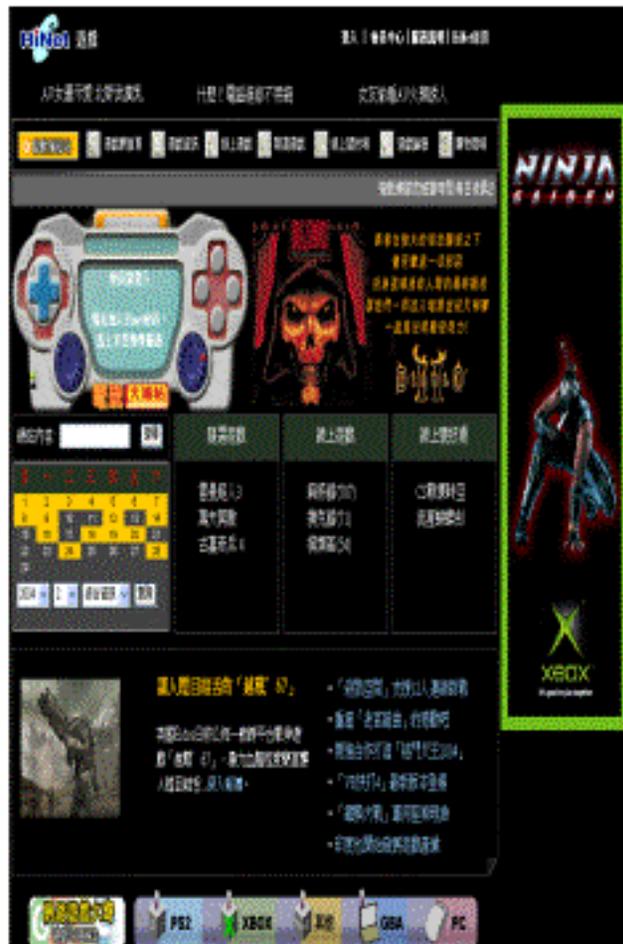
hiChannel

e-Learning

hiCall

e-Community

HiNet Game Service - hiGame (1/2)



HiNet Game Service - hiGame (2/2)



❑ Game Information

- Integrating the CMS and Media Platform to provide complete multimedia game information

❑ Prepay Credit for Games

- On line selling various internet games credit point

❑ Game on Demand

- Provide on-line renting service for various PC game

❑ Game Arena

- Developing score-ranking mechanism
- Advanced matching services

❑ Membership for CRM

- Over 800K members



HiNet Game Service - hiGame (2/2)



❑ Game Information

- Integrating the CMS and Media Platform to provide complete multimedia game information

❑ Prepay Credit for Games

- On line selling various internet games credit point

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- Provide on-line renting service for various PC game

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hiGame Case Study



❑ AOM ASIA Tournament of Age of Mythology

- The competition of top Asia gamers

❑ Date : Jun. 23, 2003

❑ Place : HiNet

- Focusing AOM ASIA, including online media, TV, newspaper and magazine.
- Thousands of gamers watch the tournament online (live broadcasting)
- Players : Top gamer from Asia countries : Taiwan, Japan, Korea, Singapore and Hong Kong



HiNet Video Service – hiChannel (1/2)



❑ User connect to broadband Internet to demand the video clips through streaming

❑ Contents :

- Movie
- Live Broadcast
- Network Radio
- Drama

❑ Payment :

- Pay per view
- Monthly Package
- Prepay HiNet Credit Points



A Special Event on hiChannel



- ❑ A live broadcast and BBS program for “Taiwan Presidential Campaign Debate” on 2004/2/21

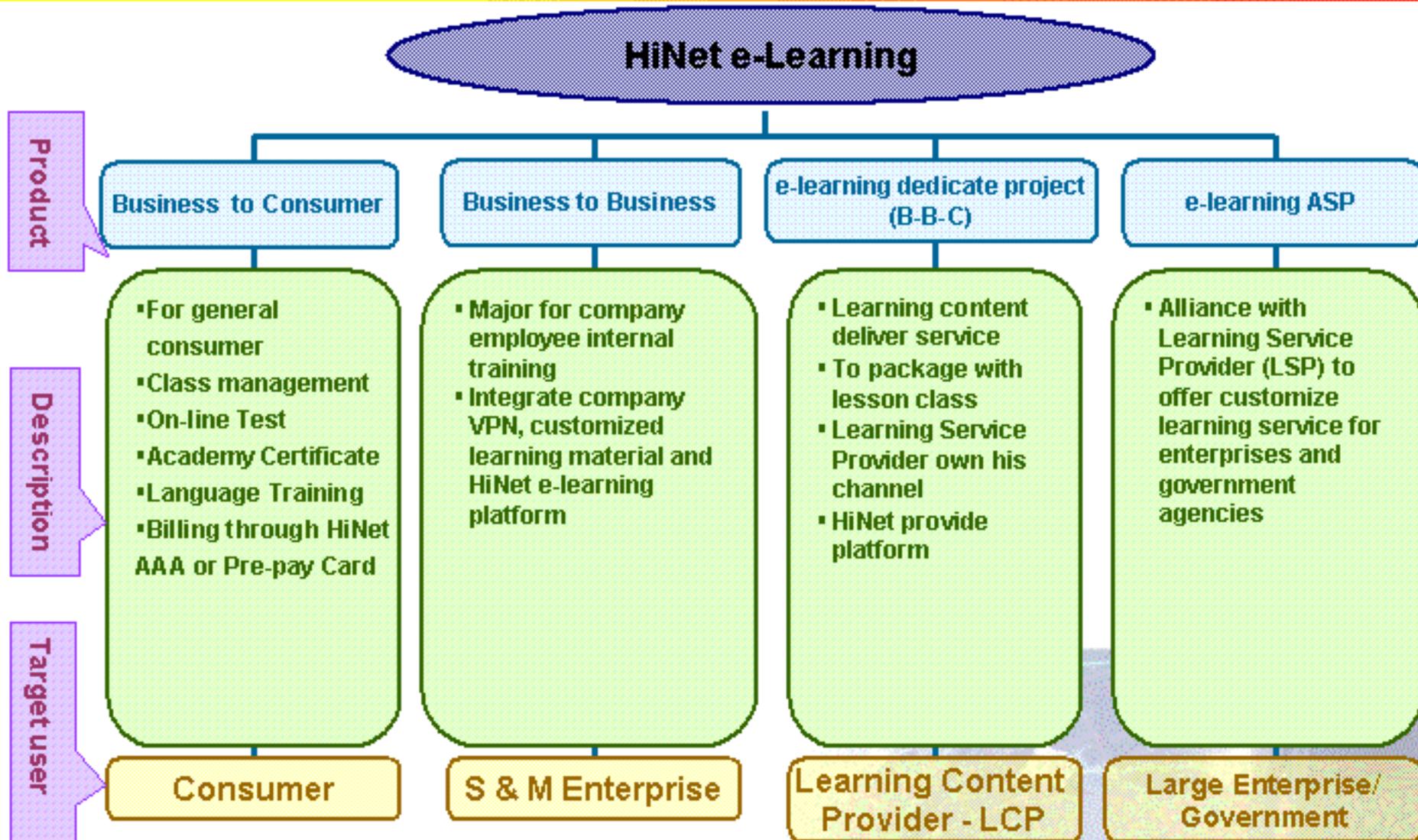
Area	Hit Rate	Band width (Mbps)	Stay Time (Min)
Oversea	20640	474.82	36.4
North Taiwan	13073	334.89	30.2
Central Taiwan	798	16.62	23.7
South Taiwan	682	16.69	26.4
Total	35193	843.01	29.2 (Staying Rate 19.46%)

❑ Analysis

- Different from ordinary TV, audiences can show their opinion on the program
- Staying Rate is high
- Oversea customers occupy high percentage



HiNet e-Learning (1/3)

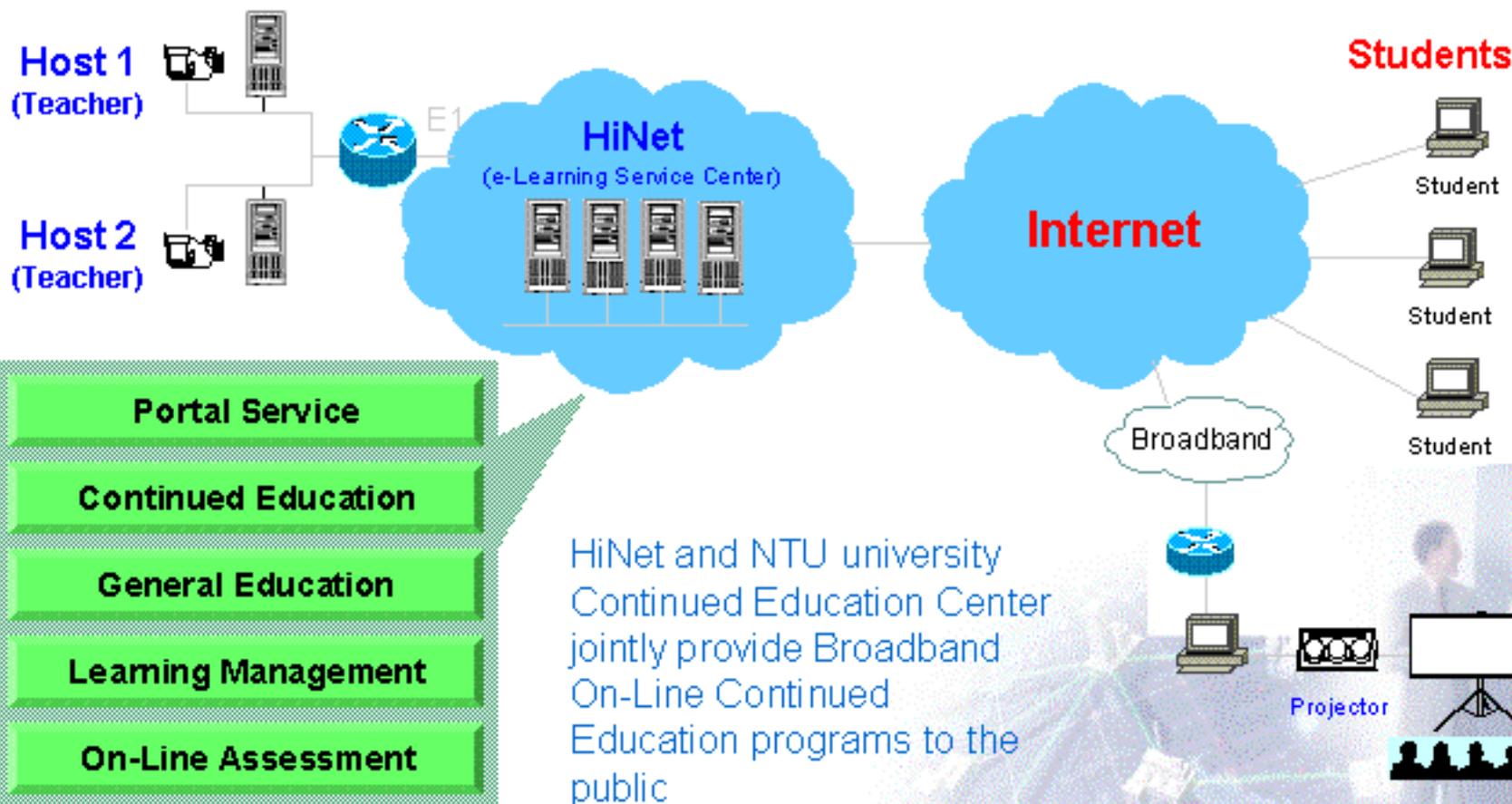


HiNet e-Learning (3/3)



On-Line University of NTU!

NTU Instructors



Special e-Learning Project for SARS



- CHT HiNet collaborate with Taipei City Government to offer a special On-Line Learning Program for elementary and high school students who are quarantined at home due to outbreak of SARS.
- Program Scope:
 - CHT sponsors studios, web site, e-Learning service platform, bandwidth and customer service to support Taipei City Government from May 15 to July 30, 2003
 - Rapid content generated by more than 200 teachers
 - Live and on-demand content for dial-up and broadband users (students)
 - Multiple channels for various classes and programs
 - Content access from HiNet hiEducation portal
 - Further extension to other cities and regions



HiNet VoIP Service – hiCall (1/3)



□ VOIP Service to Consumer

➤ Web Phone

Provide web-to-phone and web-to-web voice service for consumer

□ VoIP Service to Enterprise

➤ Web Dial

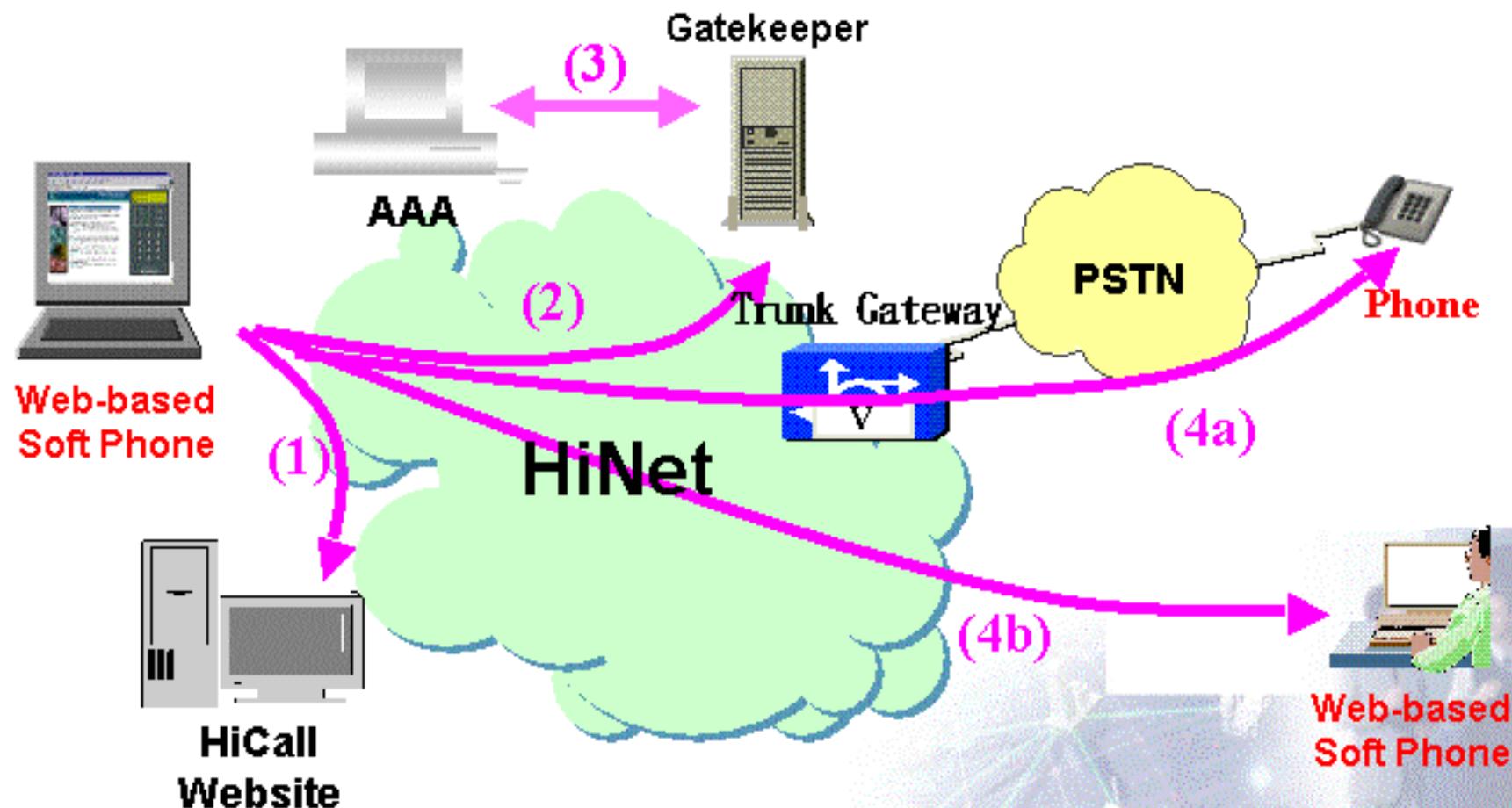
A voice hotline solution for enterprise to provide customer care service on website

➤ Voice VPN

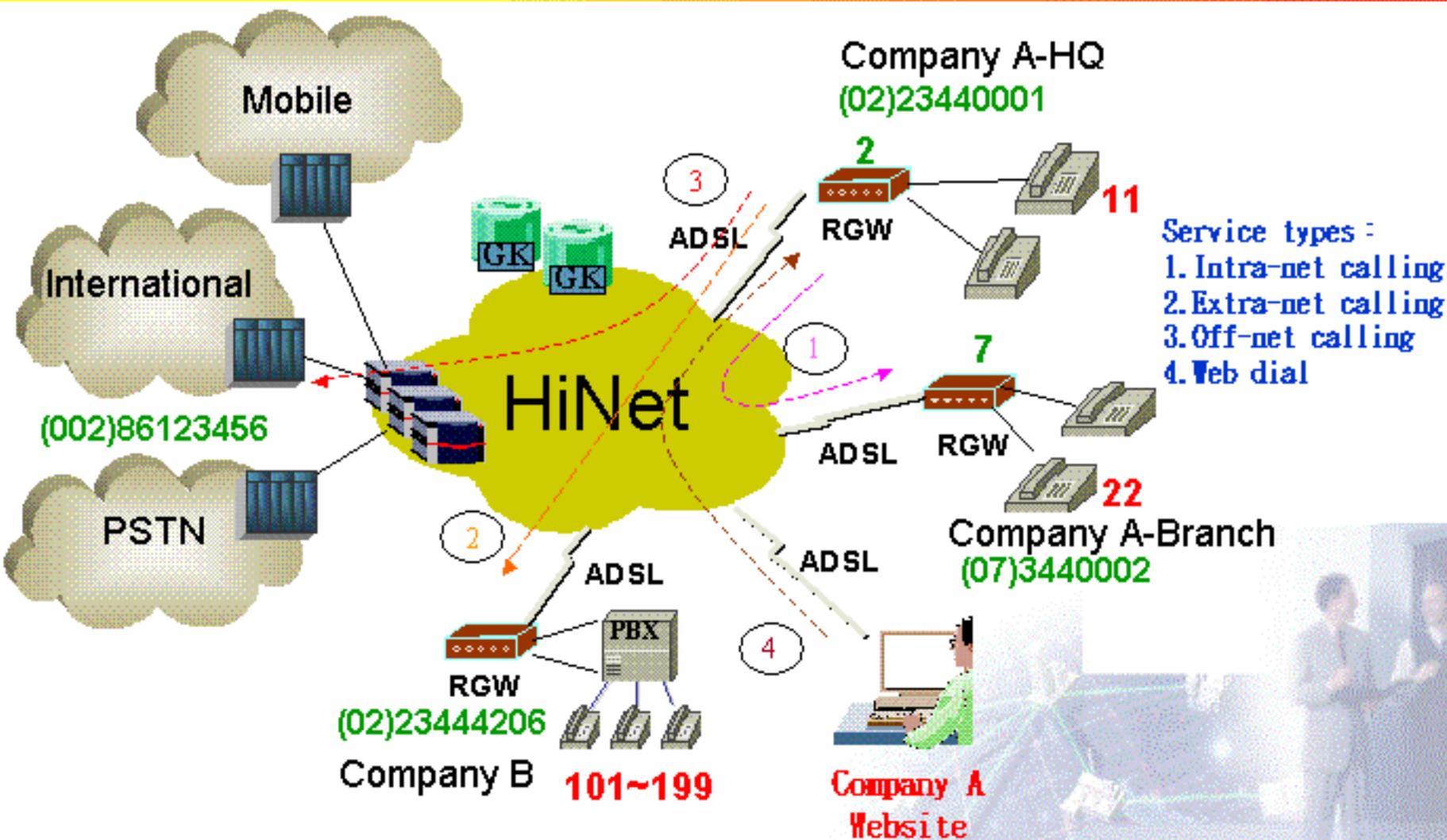
A solution for enterprise to integrate voice service on company VPN network



HiNet VoIP Service – hiCall (2/3)



HiNet VoIP Service – hiCall (3/3)



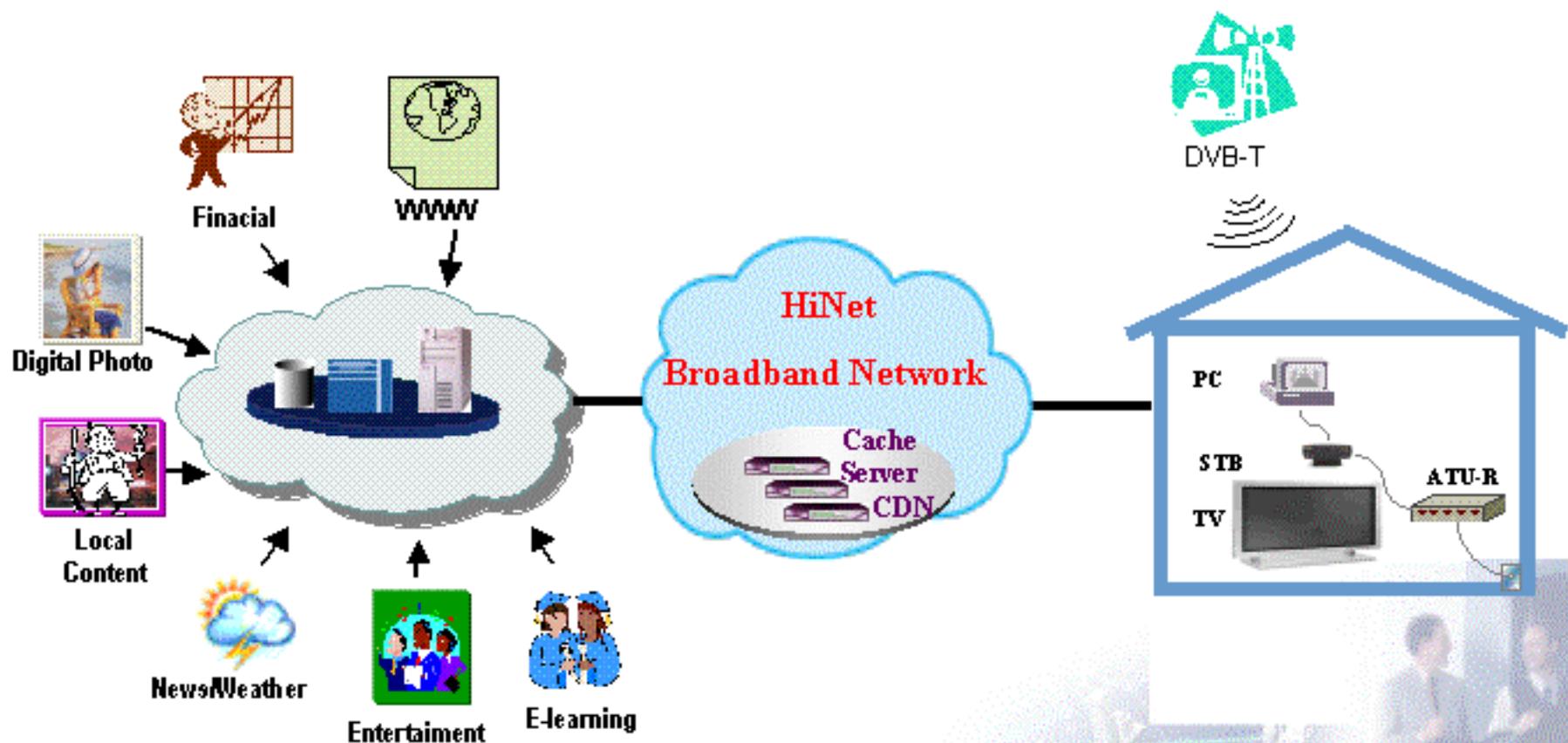
Internet TV : e-Community (1/2)



- ❑ The objective of e-Community is to reduce digital divide between city & country
- ❑ CHT offers service for all 20 trial sites with free charge
- ❑ Client Site
 - CPE: STB + TV
 - Access: 2M/384K ADSL



Internet TV : e-Community (2/2)



- ❑ A Broadband Internet Environment
- ❑ More Value-added Services are planning in e-Community project

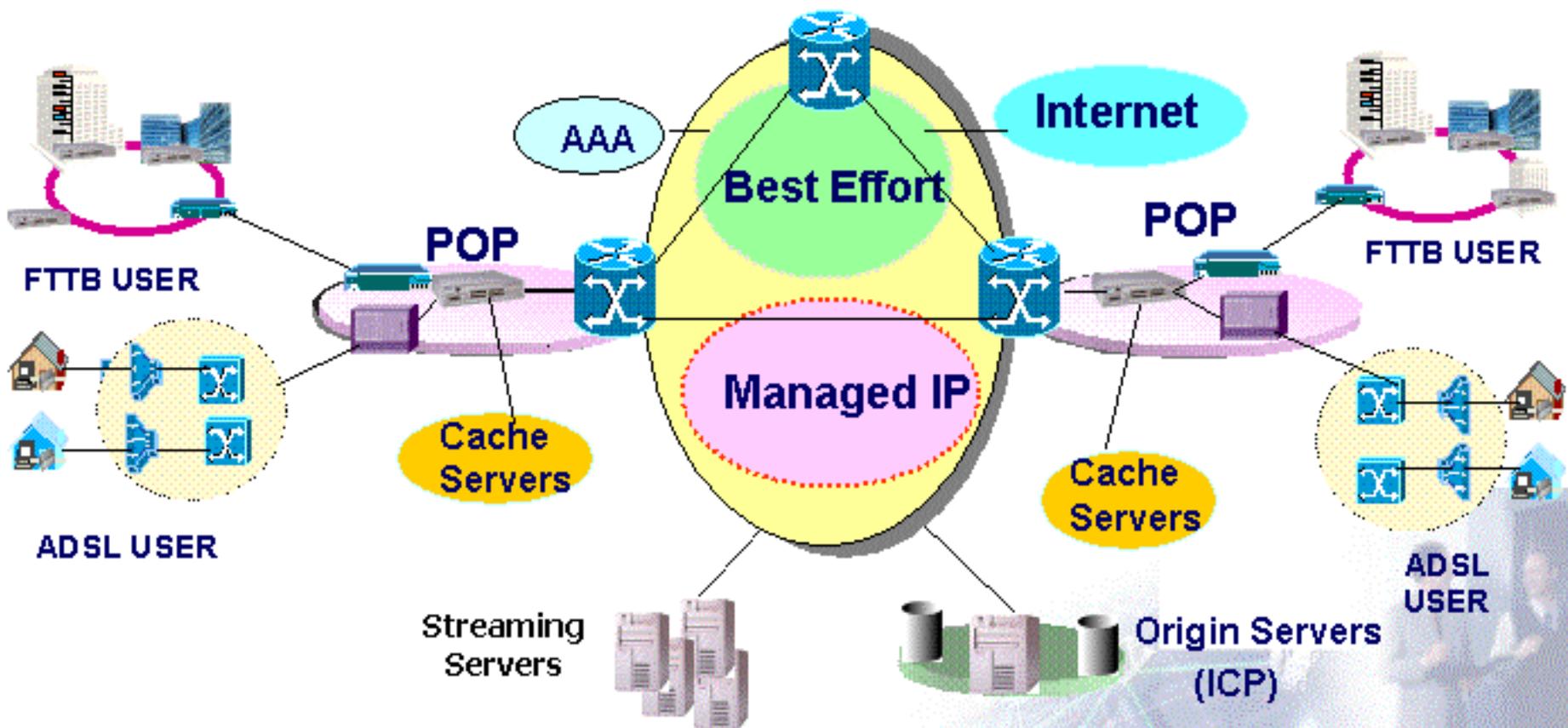


Summary

Summary (1/2)



Network Architecture for Multimedia services



- ❑ Backbone upgrade to support CoS(Class of Service)
- ❑ Deploy CDN for better performance



Summary (2/2)



- ❑ Chunghwa Telecom will provide the infrastructure with higher BW and quality to facilitate multimedia services
- ❑ Multimedia services are expected to contribute significant revenues over the next few years
- ❑ Internet TV will become a very important multimedia service over IP network



Thank you for the attention



中華電信

Chunghwa Telecom