A 1Gbps consumer Nirvana:
“What will we actually drink from the fire hose?”

Ultrabroadband Conference
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Agenda

- State of Play: Broadband Penetration
- Status Check: The Road to Ultrabroadband (UBB)
- Internet Usage today
- Internet Usage in an UBB World
- UBB Applications?
- ICT Convergence & Web 2.0 in the UBB Era
- UBB Issues & Challenges

State of Play: Internet Access Eras in Transition

2005 — Broadband Prevalence
- 175M WW consumer broadband subscribers
- Broadband surpassed dial-up

2010 — Approaching Broadband Saturation
- 70% U.S. online HHs w/broadband
- 75% WW online HHs w/broadband

20?? — The Next Era: Ultrabroadband?
- Unbounded Service Options
- Non-linear service development
Status Check: The Road to Ultrabroadband …

“1Gbps consumer services are still a long way away…”
Average Broadband Bandwidth (Kbps)

Oct 04 Feb 05 June 05 Feb 06

- Downstream bandwidth
- Upstream bandwidth

…but thinking about Ultrabroadband services is important”

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Status Check: Further Observations

Very few residential users currently have fibre-based services (e.g. Verizon FiOS = “5-50Mbps”)

Primary Method of Accessing the Internet by Home Network Ownership (% of Respondents)

<table>
<thead>
<tr>
<th></th>
<th>Home Networker</th>
<th>Non-Home Networker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable modem</td>
<td>57.0</td>
<td>46.3</td>
</tr>
<tr>
<td>DSL</td>
<td>29.4</td>
<td>50.4</td>
</tr>
<tr>
<td>Fiber (FiOS)</td>
<td>2.4</td>
<td>-</td>
</tr>
<tr>
<td>Satellite Internet service</td>
<td>1.2</td>
<td>3.3</td>
</tr>
<tr>
<td>n</td>
<td>863</td>
<td>123</td>
</tr>
</tbody>
</table>

Reason for Selecting Current Broadband Service Provider by Home Network Ownership (% of Respondents)

Why did you choose your current broadband service provider? (Select all that apply)

- Speed/ Faster Internet access
- Good Speed
- Broadband access bundled as part of a package with other services (i.e. phone, cable TV)
- No other broadband service provider available
- Best price
- Reputation of service provider
- Best technology

Source: IDC’s 2006 Consumer Panel Home Networking Survey

However, speed IS still exceptionally important to end-users
How do people use the Internet today?

✦ Today, Internet usage is mainly around communication and information purposes

✦ Most current applications are low-bandwidth

✦ QoS is more important in many cases

![Day-to-Day Internet Usage Chart]

Source: IDC Asia Pacific Consumer Usage Survey, 2005

How do people use the Internet today?

✦ Therefore 1Gbps applications seem not about extending and improving existing services

✦ Instead, they entail a paradigm shift to new high-bandwidth services

✦ Also, UBB is a platform for new converged services – FMC, ICT, and broadcast-telco convergence

![Activities Done over the Internet by Home Network Ownership Table]

Note: Multiple responses were allowed.

How do people use the Internet today?
Quick calculations on UBB traffic options...

There was an old woman who lived in a shoe*
She had so many children, much bandwidth, she didn’t know what to do...

What can go over a single **Ultra-pipe**?
- **VoIP channels** depending on the codec: 8000 to 15,000 voice channels
- **MPEG2** can peak up to 20Mbps ➔ 50 simultaneous channels
- **H.264 HD video stream** (1920x1080, 24fps) 7-8Mbps ➔ 125 simultaneous channels
- If **symmetric UBB** then can have massive traffic in both directions – P2P, Web 2.0 user generated content etc

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Will the 1Gbps consumer pipe always rattle?

- It is tempting to assert that this is too much bandwidth
- Dangerous saying this however...
  
e.g. "640K ought be enough for anybody." - Bill Gates (1981)

- Empowered users and ARPU-chasing suppliers tend to find creative ways to use spare capacity

- **Demand Objective:** Benefit from rich and abundant blended services, accessed from anywhere around the home on the device of preference
Internet Usage in an UBB world: Ultrabroadband ➔ Multi-Lane Service Racetrack

“At 1Gbps, speed is not an issue for services!"

Web 2.0+ Services
Web Services / SaaS
Fixed-Mobile Converged Services
Home-Work Blending/Teleworking
Uber File Sharing / P2P Apps
Heavy Content: Multi-Chn IPTV
Next-Gen Gaming
IMS Blended Services

Futuristic High Bandwidth Media/Content and Applications?

➔ IPTV/New media: multi-channel/Mosaic views (6 Chns), simultaneous views of sports events; picture-in-picture...

➔ Interactive Immersive gaming where footage is rendered dynamically at the service provider premise – e.g. Wingnut Interactive

➔ Uber-HDTV; Uber-Video conferencing; 3D Voxel television...?

➔ Next Generation of Web Services/ICT Converged offerings: from Google, Microsoft, AOL, Yahoo!

➔ Distributed computing - science/biotech etc
By the UBB Era, ICT Convergence will be well bedded down

VoIP Integration/Unified Communications

Web Services/SaaS

Disrupt IT model. Opportunity for telcos/ICT players to partner in delivery

UBB SaaS/Web Service Disruptions

Software on Demand: Network-based/Browser access

<table>
<thead>
<tr>
<th>Science of the Past</th>
<th>Science of Now &amp; UBB Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standalone Software</td>
<td>Always Connected &amp; Live</td>
</tr>
<tr>
<td>Monolithic Software, installed &amp; maintained CPE-side</td>
<td>Software as a continually updated Service</td>
</tr>
<tr>
<td>Upgrade Software 2-3 yrs</td>
<td>Update service every day, “Perpetual beta”</td>
</tr>
<tr>
<td>Supplier decides service characteristics/features</td>
<td>Learn from users / Users add value to shared data</td>
</tr>
<tr>
<td>Pay for “potential” of software</td>
<td>Pay for the operational capability, delivered &amp; already working</td>
</tr>
<tr>
<td>Coding as the Competence</td>
<td>Huge Datasets &amp; Manipulation as a core competence</td>
</tr>
<tr>
<td>Traditional Licences</td>
<td>Service Subscriptions/User (Consumer: “Google monthly bill”)</td>
</tr>
</tbody>
</table>
ICT Convergence Impact around Web Communities & Content

- Community Sites exploding with users & utilisation
- ICT nexuses bypass carrier-controlled service and content-delivery (distribution)
- Market shift for user:
  - Passive receiver of services & content
  - Active developer, contributor, and qualifier of content & function of Web services
- New subscription models around content as a service (Futurist: Gerd Leonhard’s world)
- New collaborative and distributed authoring models (Wikipedia, blogs, and podcasts)

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If anything will drive a need for UBB, the Web 2.0 content explosion will
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UBB Issues and Challenges

- What technologies will best deliver UBB?
- Will carriers be incentivised to invest to deliver it? (Where? When?)
- The future vision of the UBB-fed digital home, requires multiple pieces to fit together.
- Vendors across different industries: telco’s, IT, and CE – need to work together to realize the vision
- Unreadiness of suppliers
- How to drive services beyond Gen X & Y’s across entire mass-market?
Unreadiness of suppliers: When will the financial case exist for UBB?

Implementing UBB will be an expensive challenge for carriers: Constructing a new Access Network!

NZ 1.5M landline users → carriers would need 1.5 peta bps (US → start talking exa and zeta bit routers).

Expensive core and edge network equipment overhauls

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<th>Symbol</th>
<th>Equivalent</th>
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</table>

Narrowband → Broadband → Ultraband

Transition consequences…

U.S. Consumer Internet Access Revenue

Revenue shifting
- Migration of dial to broadband
- Margin pressure →
  - Consolidation
  - Transformation of ISP business models

“Broadband access most important as the platform for services”

Industries collide over battle for subscribers and revenue

…but what will be the consequences of the Broadband to Ultrabroadband transition…?

Commoditization of services drives new business models
P2P File-sharing Insanity to sanity transition before 1Gbps...

- At 1Gbps, P2P file-sharers with bit-torrent can go insane
- With ultra-pipes and cheap storage the question is:
  “Why put 5,000 movies on your 100 terabyte hard drive?”
  Answer: “Because you can!”

- However, P2P mentality may change, because with high-performance, unconstrained streaming, you can let your service providers host everything
- If everything is available for you, it is just about selecting your content (NB Gerd Leonhard)
- At 1Gbps, and with evolved content delivery models, consumers should largely lose the sensation of wanting to “Own” and manage content locally

NZ ICT Ecosystem as a Proxy for Global Supplier Interplay

UBB Mergers & Acquisitions: fascinating permutations may occur
**Essential Guidance**

- Heading towards the Ultrabroadband Era, suppliers need to:
  - Examine their service portfolios and begin thinking about **NGN Uber-Generation services and new business models**

- Make services personalised/relevant, non-cumbersome, convenient, effortless, available anywhere in home

- Service Providers: Need to prime the High-Pressure services they will blast down the pipes

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