Network Architecture for WiMAX applications

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Agenda

- Mobile market trends in APAC
- What's happening in mobile infrastructure network (and why!)?
 - Packet optimization for 2G networks
 - Packet evolution for 3G
 - Operator case studies
- WiMAX Friend or Foe?

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- WiMAX backgrounder
- Positioning compared with cellular
- Summary Key Trends for 2005



Mobile Operator Evolution



Applications and Drivers

- Mobile operators actively building out IP/MPLS core networks
 - Capex and ongoing opex savings consolidate multiple networks
 - Migration of SS7 over IP using Sigtran techniques
 - High Availability infrastructure to support VoIP; PTT launching now
- Wireless data services picking up
 - Recent growth driven by new terminals & applications
 - Required to counter declining voice ARPU and competition

"AIS launching 40 new data applications this year as part of an objective to double non-voice revenues" CEO Somprasong Boonyachai

- Access costs still major opex factor looking at means to optimise
- Increasing corporate market for mobile data
- Lots of Hype on WiMAX...



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CDMA – Optimising 2G with IP Backhaul

- Today's challenge
 - Optimise established 2G TDM RAN to handle continued scaling
- Objective: Reduce RAN Opex by moving to IP backhaul for 2G voice and data

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 10-30% savings in compression moving to IP



Packet Architectures for 3G CDMA2000 EV-DO – IP based

- 3GPP2 specifies either ATM or IP transport from EV-DO base station
- EV-DO deployments nearly all now based on native IP
- Aggregation IP layer key requirements scaling and High Availability
- APAC Mobile operators already deploying



Example Asian UMTS-WCDMA Operator New IP-MPLS Multiservice core

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Example Asian UMTS-WCDMA Operator Advanced High Availability design



Asian Mobile Operator: New service - Mobile VPN access

- **Objective provide VPN access for variety of mobile corporate users**
- Outsource mobile remote access management from corporates, and aggregate users in a layer 3 VPN
- Solution:



CPE

Value Add Offering Target industry verticals eg- transportation

- Strong proposition New Revenues and Competitive Differentiator for Mobile Operator
- Central IT manager control and reporting via Policy Server Web portal
- Apply company policies in real time without manual intervention
- Applicable to remote telemetry, sales dispatch, fleet management etc



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WiMAX – So...what is it?

- New set of efficient radio technologies enabling broadband connectivity over wireless
- Fixed and mobile variants
- Promoted heavily by Intel growing industry support
- Designed to operate in both licensed AND unlicensed spectrum – key difference
- Just access technology still needs IP subscriber management to control and deliver services

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ACCESS 802.16-2004 & 802.16e	PORTABILITY 802.16e	MOBILITY 802.16e	
<text></text>	Since Fixed Indoor Fixed Indoor Since Since <th>Mobile</th>	Mobile	
 Volume: 100's of thousands Deployable: Q2'05 (16e in '06) Fixed Access Data Focused RG's for PC Clients 	 Volume: 100's of thousands Deployable: 2006 Fixed and Portable access Data, some Voice RG's & PC Cards 	 Volume: Millions Deployable: 2007 Mobile Access Data, Audio, Voice, Video? Client Integration for PC's & Handhelds 	
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Contrasting WiMAX, WiFi and 3G

	WiFi 802.11g	WiMAX 802.16- 2004*	WiMAX 802.16e	CDMA2000 1x EV-DO	WCDMA / UMTS
Approximate maximum reach	100 meters	8kms	5kms	12kms	12kms
Approximate maximum throughput	54 Mbps	75 Mbps (20 MHz band)	30Mbps (10 MHz band)	2.4 Mbps (higher for EV-DV)	2Mbps (10+ Mbps for HSDPA)
Typical Frequency bands	2.4 GHz	2-11 GHz	2-6 GHz	400,800,900, 1700, 1800, 1900 2100 MHz	1800, 1900, 2100 MHz
Availability	Now	Ratified in June 2004, products in 2005	Expected ratification in Q3 2005, products in 2006	Now	Now
Application	Wireless LAN	Fixed Wireless Broadband (eg- DSL alternative)	Portable Wireless Broadband	Mobile Wireless Broadband	Mobile Wireless Broadband

In future WiMAX 802.16e will compete with UMTS/HSDPA and EV-DV

Korea will be first to deploy mobile broadband with WiBro in 2.3 GHz spectrum from 05



Mobile Carrier Service And Network Evolution



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Summary – What to look for in 2005

- WiMAX for *fixed line alternative* will go into trials and early deployments
 - Valid niche... little or no overlap with 3G
- WiMAX *mobile broadband* is still 2-3 years away
 - Industry will look to Korea as test, device availability and costs key
- 3G operators accelerate their move to new packet architectures
 - Drivers new services, reduced costs, voice & signaling move to IP
 - IPv6, High Availability and ATM over MPLS are key
 - Technology now proven successful deployments today
- Continued value add to corporate space eg SSL VPN
- IP Router manufacturers like Juniper are active and key players in new mobile infrastructure



IPv6 requirements in the network



 From 3GPP Release 5 – IMS services should include IPv6 support; interwork with wireline v6 services (eg Japan) Signaling Media

 Mobile Operators network hardware needs to be IPv6 capable today

WiMAX Industry Momentum

* Juniper considering joining

EQUIPMENT MANUFACTURERS

SERVICE PROVIDERS

