



mobikom austria | group

HSDPA driving Mobile Broadband

A brief Review on 9 Months of Commercial Operations

Mobile Broadband Americas

October 18 - 20, 2006, Las Vegas

Dr. Norbert Rohringer
mobilkom austria group services

Presentation Outline

- mobilkom austria group
- The success of Mobile Broadband
- Deploying HSDPA
- Challenging WCDMA/HSPA
- Conclusion



mobilkom austria group



Austria

Bulgaria

Croatia

Slovenia

Liechtenstein



Spirit & Strategy

- Goal: Leading mobile service provider in south-eastern Europe
- Regional focus: “Think global, act local”
 - Country-specific approach to meet market and customer requirements
 - Powerful local brands
- Increase of corporate value through:
 - Leadership in innovation and quality
 - Horizontal growth in strategically relevant regions
 - Maximizing benefits of partnerships (Vodafone) and alliances
 - Personnel development on an international level

Key Data - mobilkom austria group

- Over nine million customers and nearly 6,000 employees in five countries
- Operators are all number one or two in their respective markets
- Efficiency advantages through rapid introduction of new technologies and intelligent use of capex

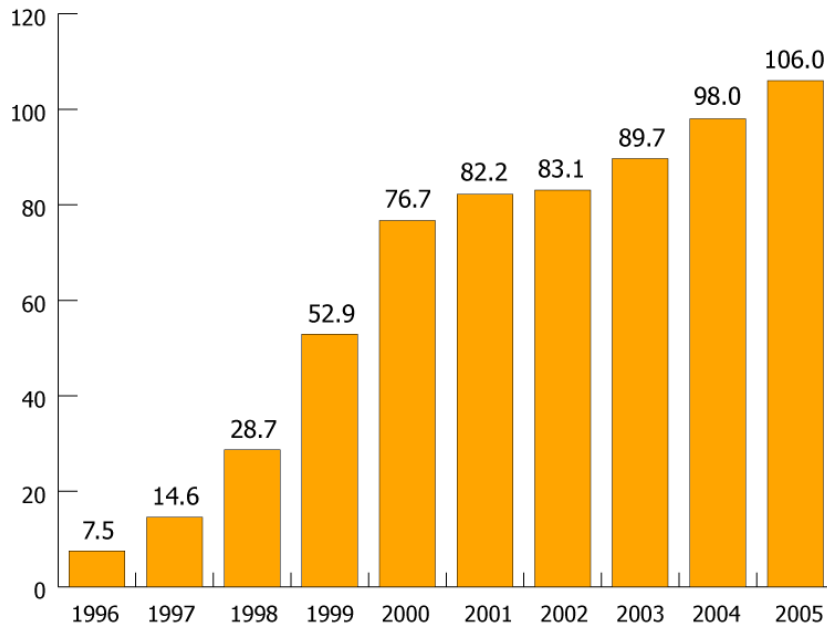
Status: 1. Half 2006

Key Facts - mobilkom austria group

	Pop.	Mob. Penetration	Customers	Employees	Rev. [M€]	Adj. EBITDA
	30.06.2006	30.06.2006	30.06.2006	30.06.2006	1 H 2006	1 H 2006
mag	22.46m		9,46 m	5,968	1,399.1	579.3
mobilkom austria	8.18 m	109.8%	3.47 m	2,211	856.1	320.4
Mobiltel	7.85 m	90.6%	3.86 m	2,402	271.0	161.7
Vipnet	4.41 m	91.0%	1.73 m	1,040	218.0	81.3
Si.mobil	1.98 m	82.6%	392,700	290	58.2	13.6
mobilkom liechtenstein	0.035 m	81.1%	4,500	13	12.3	2.0

The Austrian Mobile Communications Market

Market Penetration
in Percent



- Population: more than 8.0 million
- High mobile penetration: 109.8%
- Small Country with four network providers, five MVNOs, two service operators and one Call-through-provider
- Intense competition
- mobilkom austria: With a market share of 38.5% and nearly 3.5 million customers the Austrian leading mobile communication provider

mobikom austria: New Technologies

- First full-coverage GPRS-network worldwide (2000)
- First network operator with WAP-Push technology worldwide (2001)
- First national UMTS-network in Europe (2002)
- First national network operator with Push-to-Talk technology (2004)
- First EDGE-network in Austria (2005)
- First HSDPA-network in Austria (2006)



mobikom austria: Innovations

- ÖBB MOBILE TICKET - World's first actual m-commerce application (1999)
- A1 MOBILGUIDE - Europe's first "Location Based Service" (2000)
- A1 TELECOMMANDER - Control devices remotely using mobile and Internet (2002)
- Mobile payment of parking fees (2003)
- A1 SIGNATURE – Digital signature with the mobile phone (2004)
- MOBILE BROADBAND – High speed internet access with flat-rate and mobile datacard



Mobile Broadband The Success Story

Mobile Broadband – The Success Story

- WCDMA – The enabler for Mobile Broadband
- mobilkom austria
 - ~100,000 total connect cards by June 2006
 - With around 100,000 data cards sold, mobilkom austria is one of the partners with the best performance within the Vodafone Group
 - Successful application on 3G



**Espresso statt Verlängerter:
MOBILES BREITBAND zum Fixpreis.**

inkl. 500 MB nur
€ 39,- pro Monat*

Einfach einsteigen und durchstarten.

MOBILES BREITBAND inklusive 500 MB monatlich **am nur € 39,-** pro Monat und dazu die **Vodafone Mobile Connect Card UMTS am einmaligen € 39,-** – schnell laden! Sie wählen, Cover und Folien jetzt nach schneller Montage. Einfach bis 30.04.06 anmelden und € 40,- Herstellergarantie sparen. Weitere Informationen erhalten Sie unter **0800 664 600** oder **www.A1.at/mobilesbreitband**

A1
vodafone

mobilkom austria – Connect Cards Sold



HSDPA Enabled Hardware

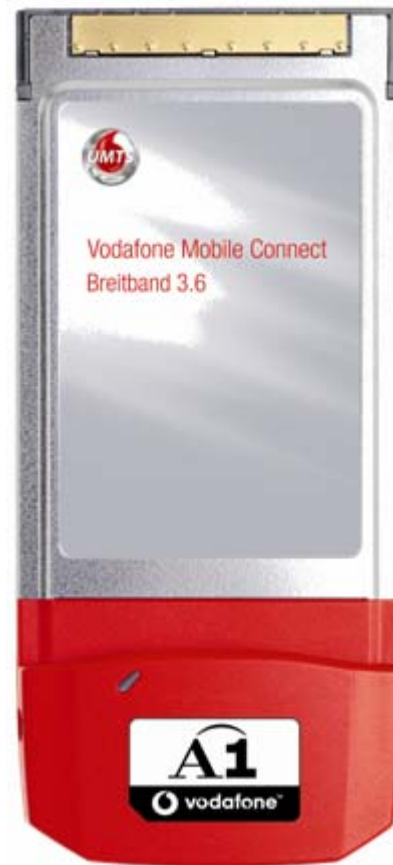
HSDPA 1.8, UMTS+EDGE



HSDPA 3.6, UMTS+EDGE



HSDPA 3.6, UMTS+EDGE



3G/UMTS Router

- WLAN Router with PC Card Slot for the Vodafone Mobile Connect Card
- PC/Laptop Connectivity LAN or WLAN
- Internet connectivity: GPRS/EDGE/UMTS/HSDPA or WAN (ADSL)
- 199€



Mobile Broadband Product Portfolio



	Monthly fee	Inc. vol.	Add. MByte	HW
A1 MOBILES BREITBAND 300	19* (29€)	0.3GB	0.50€	99€
A1 MOBILES BREITBAND 600	29* (39€)	0.6GB	0.25€	0€
A1 MOBILES BREITBAND 1200	49* (59€)	1.2GB	0.25€	0€
A1 MOBILES BREITBAND 3600	89* (99€)	3.6GB	0.25€	0€

*With A1 registration until 31st of October 2006

The Mobile Portal from A1: VODAFONE LIVE!

vodafone live! **A1**

Premiere: Fluch der Karibik 2 - Jack Sparrow ist zurück!

• **Gimme, Gimme, Gimme (Yoomii) ein neues Musikfreizeichen!**

• **UNO bestätigt: Österreiche unter toten Blauhelmen**

- live! aktuell
- live! TV + Videos
- Handy Styling
- Spiele
- Musik
- Chat + Mail
- News + Wetter
- Sport
- Info-Point
- Shopping
- Erotik
- Mein live!

Suche Go

live! TV + VF live! Entertainment

15 Channels

live! TV

Entertainment

€9,-

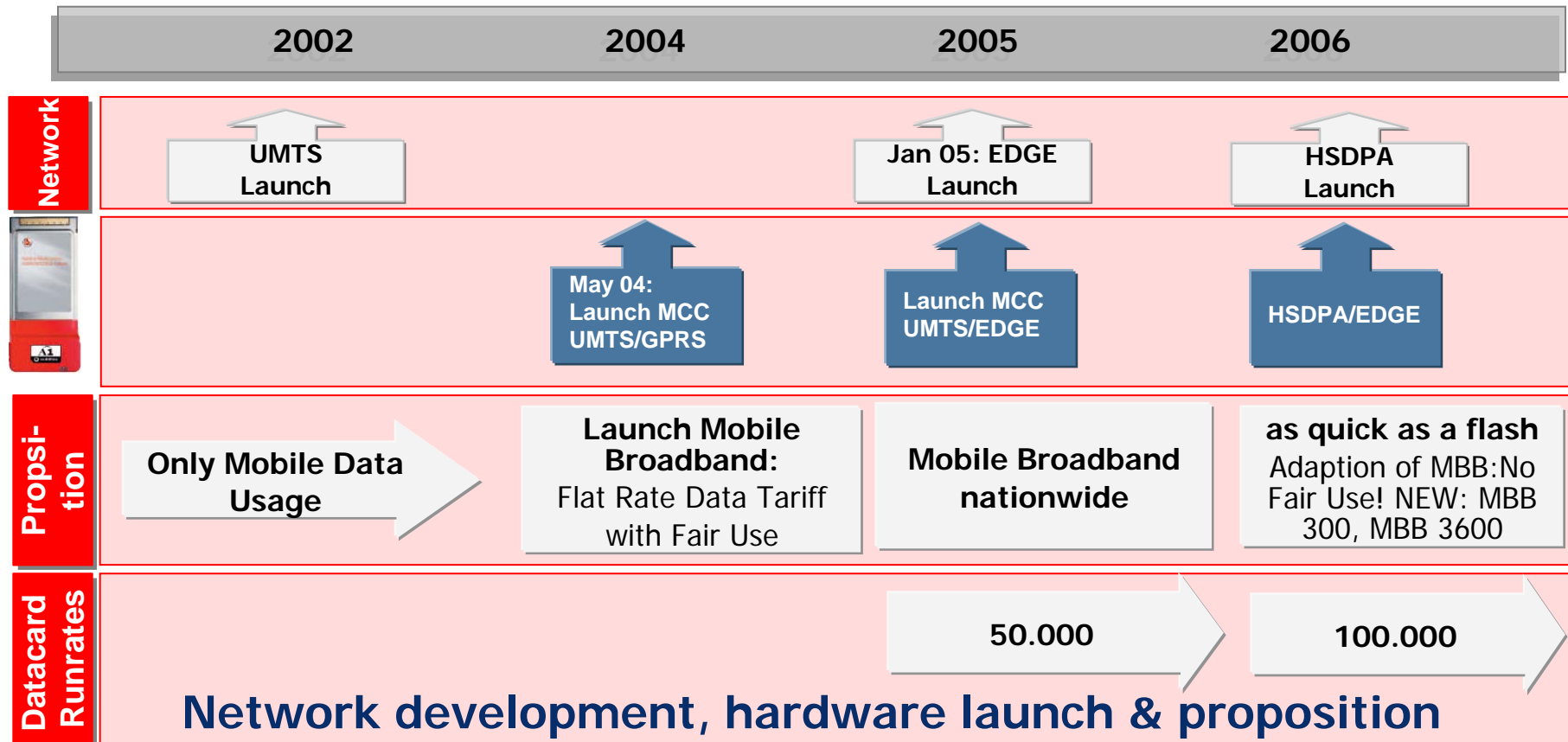
€9,-

€5,-

ORF 1, EUROSPORT, HBO, GO! SAT 1, 24, ORF 2, CNN, chillimedia, ATN, EuroNews, Nike, UNO

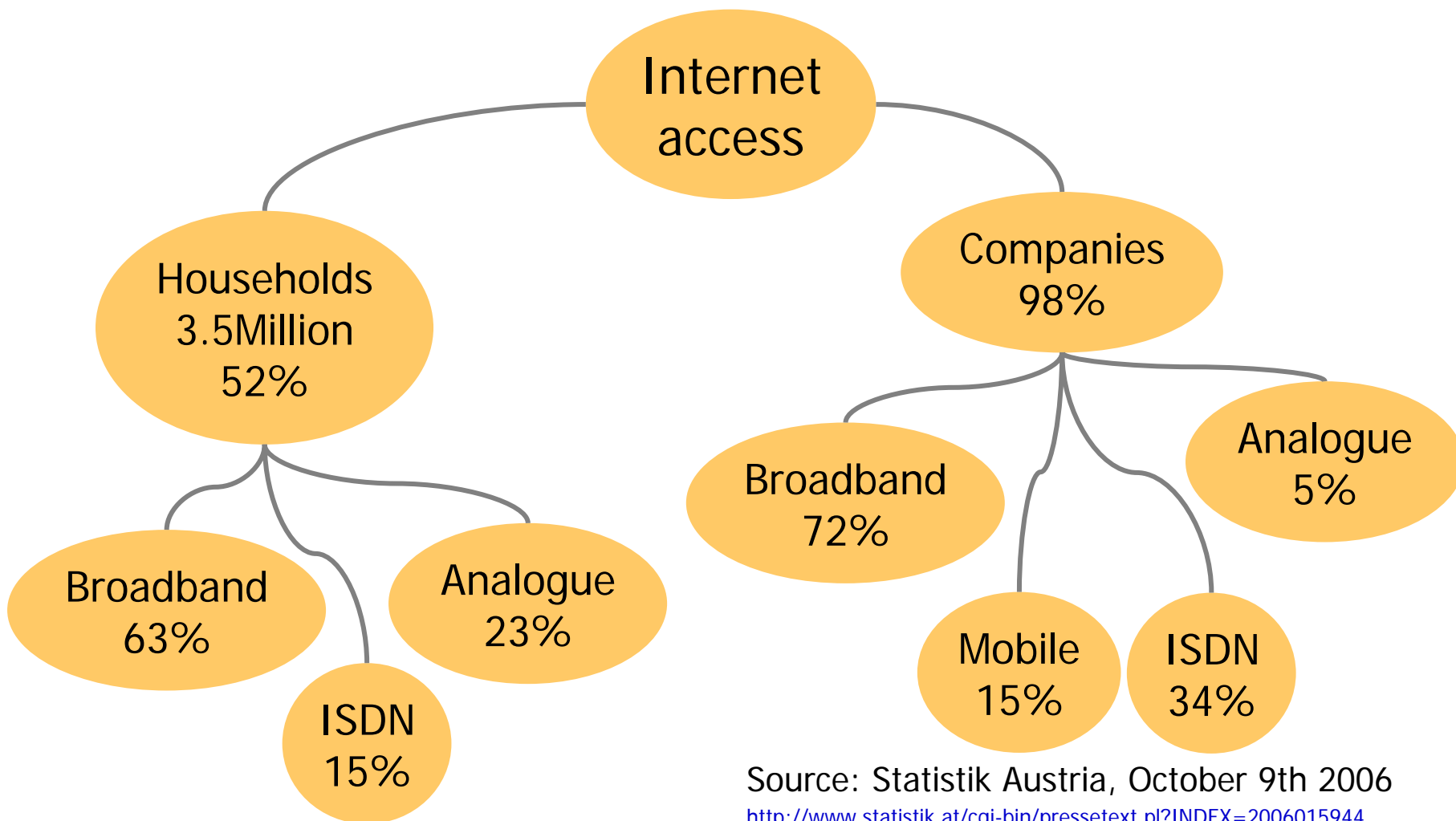
Unlimited TV-Clips, 1 MP3 ringtone per month, 1 game per month

Proposition Evolvment



Network development, hardware launch & proposition go "hand in hand"

Accessing the Internet in Austria



Source: Statistik Austria, October 9th 2006

<http://www.statistik.at/cgi-bin/presstext.pl?INDEX=2006015944>

The Austrian Fixed Broadband Market

Provider	Product	Incl. Data- volume [Mbyte]	Down- stream [kbps]	Up- stream [kbps]	Monthly rate [€]	[US\$]	US\$ / Gbyte
Telekom Austria	AonSpeed	400	384	128	20	25,4	64
		800	1024	256	30	38,1	48
		2000	1024	256	40	50,8	25
		5000	1024	256	45	57,2	11
		fair use	2048	384	55	69,9	
Tele2UTA	ADSL Start	400	384	128	19	24,1	60
	ADSL 800MB	800	1024	256	29	36,8	46
	ADSL 2GB	2000	1024	256	38	48,3	24
	ADSL 5GB	5000	1024	256	43	54,6	11
UPC	chello classic	fair use	4096	512	49	62,3	
	chello plus	fair use	8192	768	69	87,7	
	chello student connect	fair use	4096	512	35	44,5	
	chello light speed	1000	1024	256	26	32,9	33

1 Euro (EUR) = 1.27041 US Dollar (USD) [Sept. 13th]

Key Success Factors

- Drive Network Development
 - Superior network coverage as THE magic ingredient
 - Speed is the decisive factor to enhance usability
 - Allows to charge a price premium
- Improve customer experience
 - Keep your services simple and understandable
 - Excellent usability of installation software AND user interface
 - Dedicated pre- and after sales support
 - Availability through-out all channels
- Target-group tailored pricing
 - Keep it simple: convergent pricing strategy
 - Flat rate pricing
 - Group pricing for corporates
- Invest into communication
 - Heavily invest into multi-layer communication approaches
 - Focus on the most important USP/message in communication

BLITZSCHNELL SURFEN.

MOBILES BREITBAND AB

€19,-
INKL. 300 MB
PRO MONAT

VODAFONE MOBILE CONNECT CARD BREITBAND

- Überall mit Highspeed im Internet surfen
- Unterwegs E-Mails abrufen und senden
- Flächendeckend in ganz Österreich

HSDPA

WIR VERBINDEN, WAS SIE VERBINDET.
MIT MOBILEM BREITBAND ÖSTERREICHWEIT.

Mit A1 sind Sie österreichweit österreichweit – blitzschnell.
Infos: 0800 664 664 • www.A1.net

A1
mobilkom austria

z.B. - Grundgebühr/Monat für die ersten 10 Monate bei Einzahlung in MOBILES BREITBAND 300 MB 39,00 € (z.B. - Grundgebühr/Monat bei Überschreitung des monatlich inkludierten Datenvolumens werden 40,50 €/MB verrechnet.

Deploying HSDPA

Technology Strategy

- Innovation leadership
- Quality leadership
- No technology pricing
- Hide technology complexity
- Standardised solutions
- Leverage synergies
- Integrated multilayer network
- Multivendor networks



HSDPA: Now a market reality

- 25+ HSDPA networks already in service
- 90+ HSDPA networks planned, in trial or in deployment...

EUROPE

- Orange France **in pilot launch**
- T-Mobile (Germany & Austria) **launched March 06**
- Mobilkom Austria **launched Jan 06**
- H3G Italy **launched Feb. 06**
- O2 / Manx Telecom **launched Nov 05**
- Vodafone Germany & Portugal **launched Mar. 06**
- SFR (France) **launched bus. June 06**
- Optimus Madeira **launched Feb. 06**
- Elisa Finland & Estonia **launched April 06**
- Swisscom Switzerland **launched Mar. 06**
- TIM (Italy) **in trial**
- Mobiltel Bulgaria **launched March 06**
- Eurotel Czech Rep. **launched Apr. 06**

ASIA PACIFIC

- NTT DoCoMo **in trial**
- Sunday Hong Kong **in trial**
- KTF Korea **in trial**
- SKT Korea **launched May 06**
- M1 Singapore **in trial**
- Smart Com & Globe (Philippines) **April 06**

MIDDLE EAST / AFRICA

- Wataniya Kuwait **launched Feb. 06**
- Etisalat UAE **launched April 06**
- MTN & Vodacom RSA **launched April 06**

NORTH AMERICA

- Cingular AT&T US **launched Dec 05**
- Rogers Wireless Canada **in trial**

...plus HSUPA launches from 2007

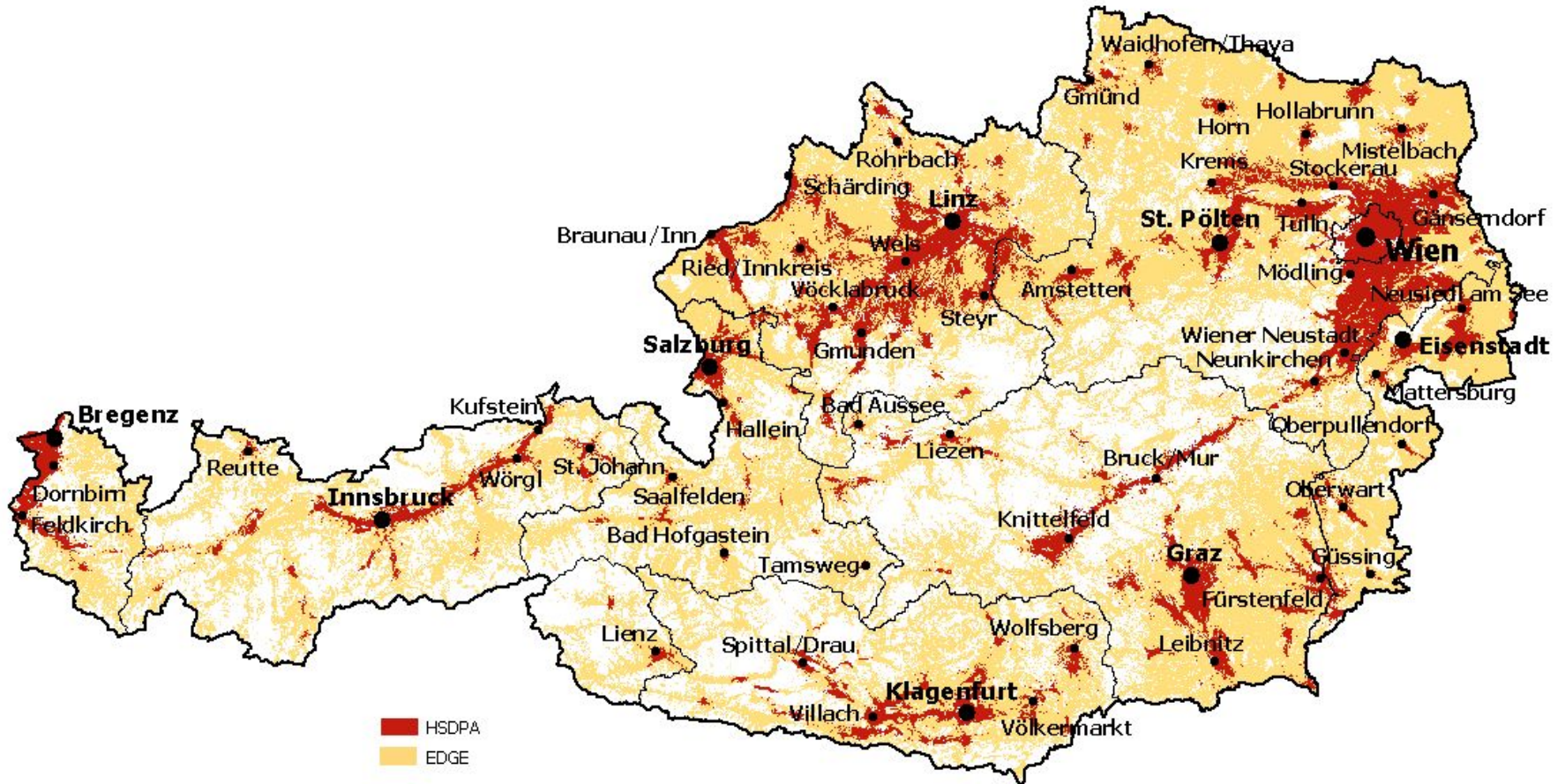


IMPACT Meeting#10
Sophia Antipolis, 29 June 2006

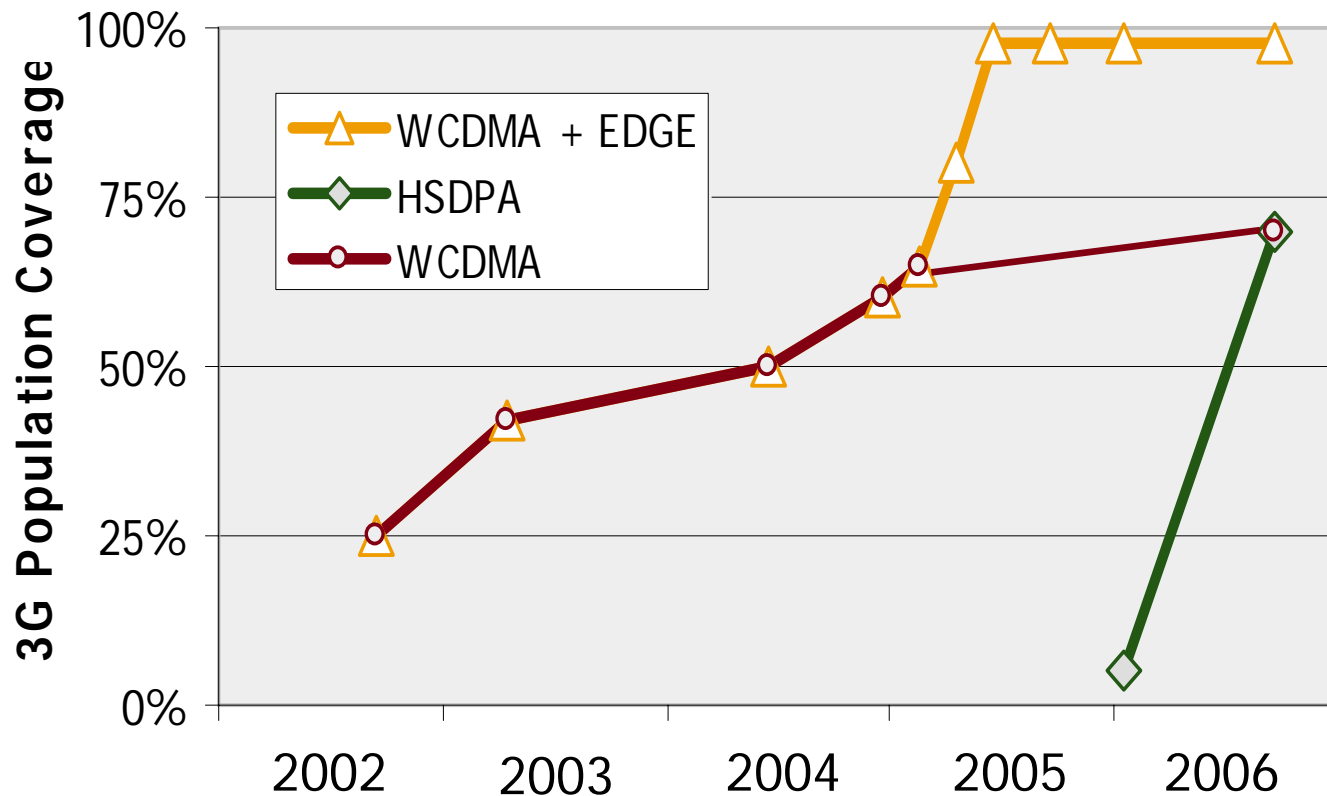
Mobile Cellular Infrastructure of mobilkom austria

- 3G Multivendor: Ericsson and Nortel Networks
- WCDMA complemented with EDGE
- 2G Multivendor: Motorola and Nokia
- WCDMA + EDGE covers 98% of population
- WCDMA: 70% population
- HSDPA 1.8Mbps = WCDMA coverage -> 70% pop
- HSDPA 3.6Mbps 33% (all regional capitals)

Mobile Cellular Infrastructure of mobilkom austria

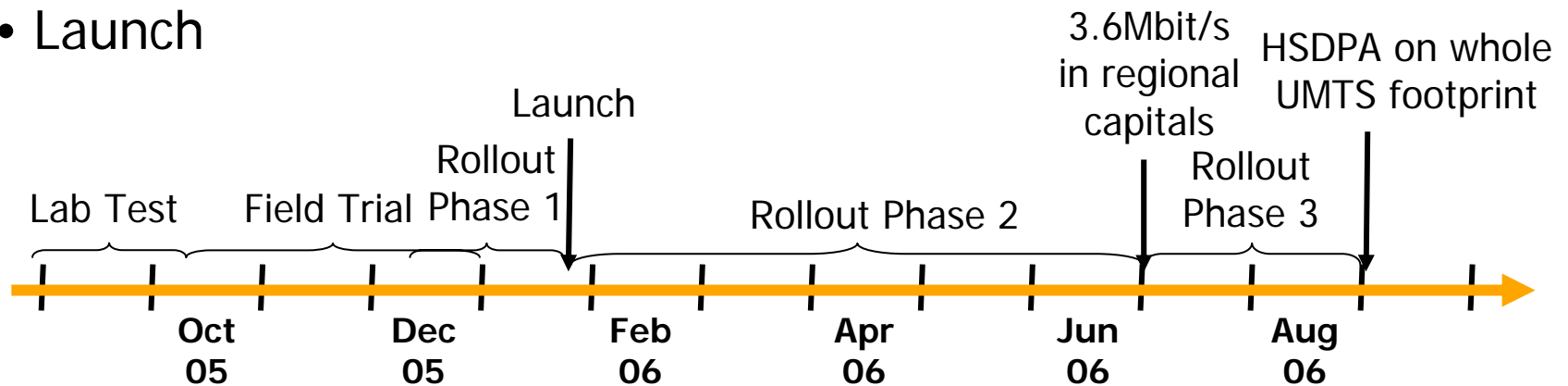


mobilkom austria's 3G Rollout



HSDPA - Launch Process

- Lab integration & tests
- Field trial
 - Understanding of system behaviour
 - KPI measurements
 - Friendly customer trial
- Launch



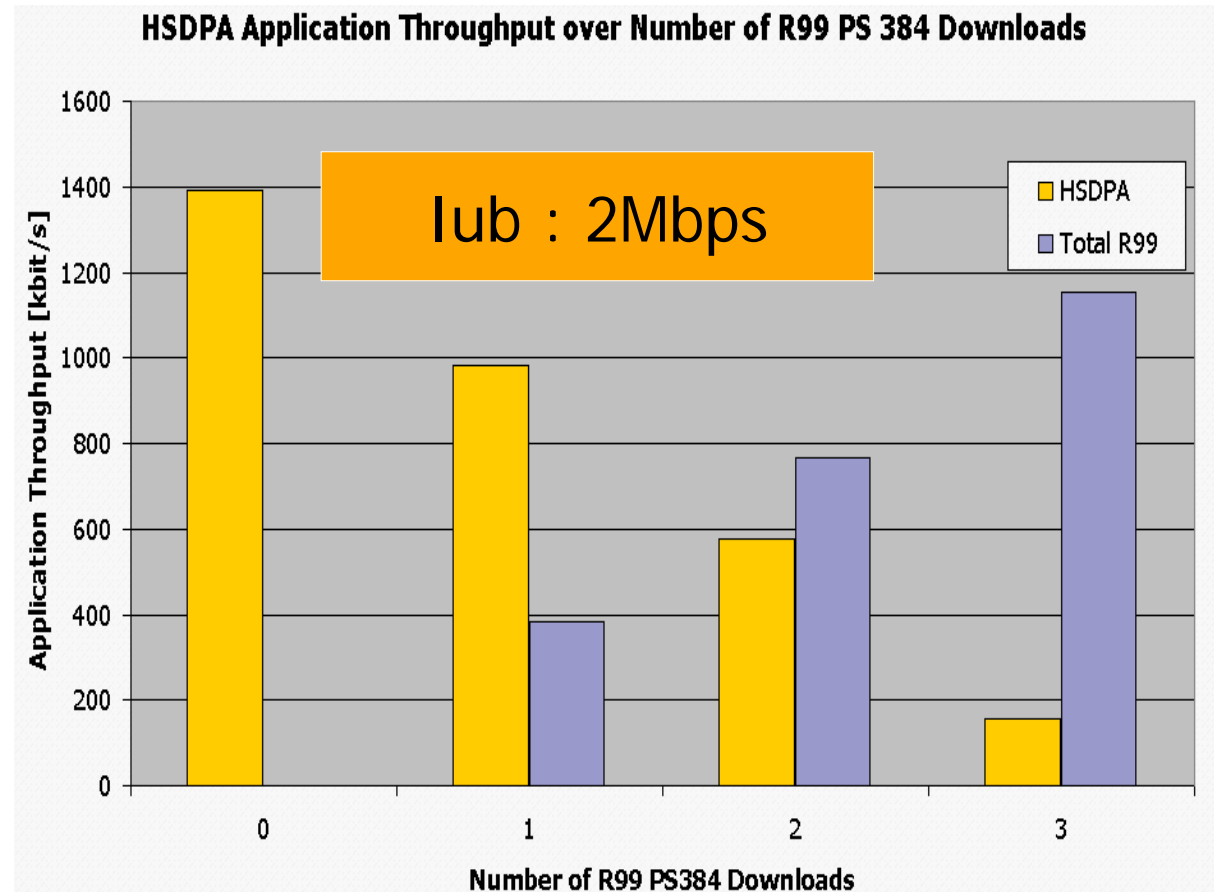
apx. 1 year from lab integration to full implementation

HSDPA – Technical Challenges

- Assessing coverage scenarios
- Mostly it is not only software
- Node B backhaul bandwidth
- Additional baseband processing resource
- Shared R'99/HSDPA carrier versus dedicated
- Output power limitation
- Assessment of site grid density
- Interworking with 2G
- Assessment of TCP – default settings
- GRX – bandwidth

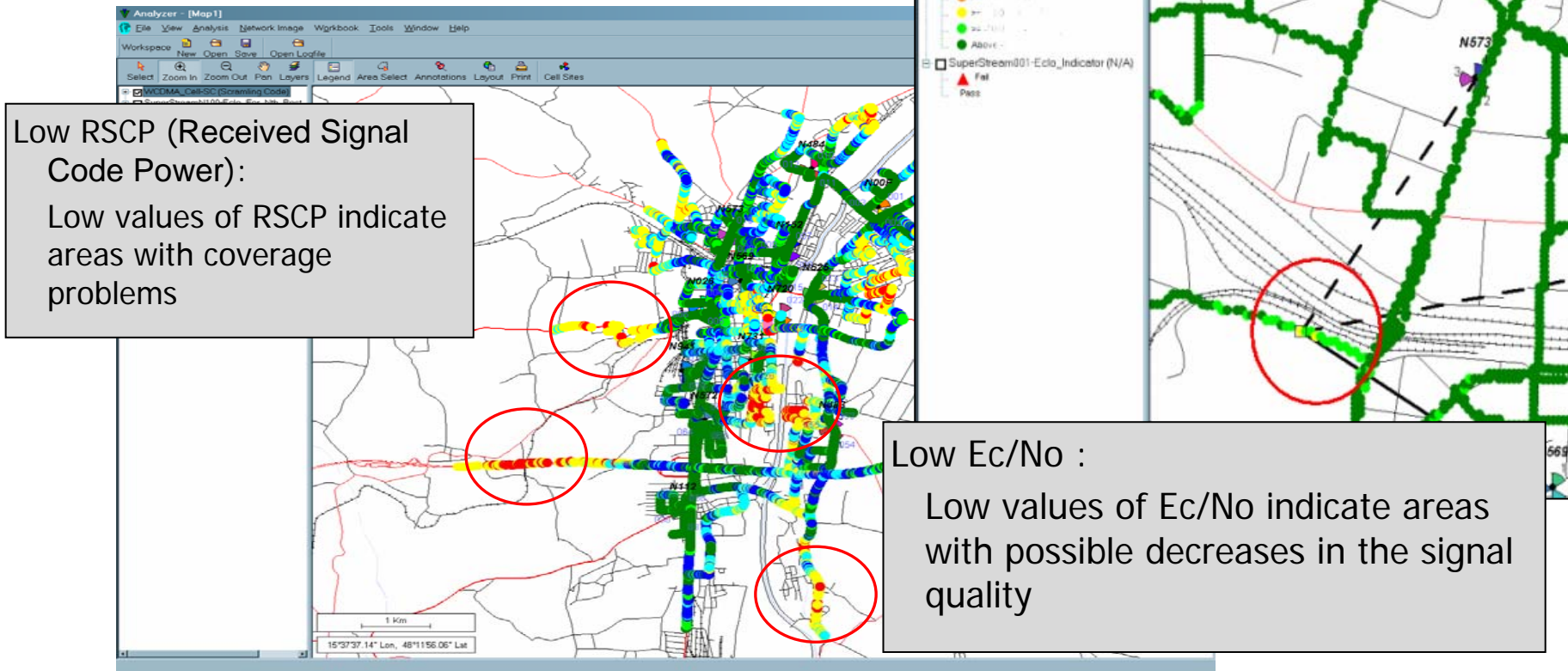
Node B Backhaul Upgrade is Required

- Performance for 2Mbps backhaul
- Max. 1.4Mbit/s
- R99 higher priority
- Throughput decreases with increasing R99 load
- 3 R99 downloads
-> HSDPA:
155kbit/s



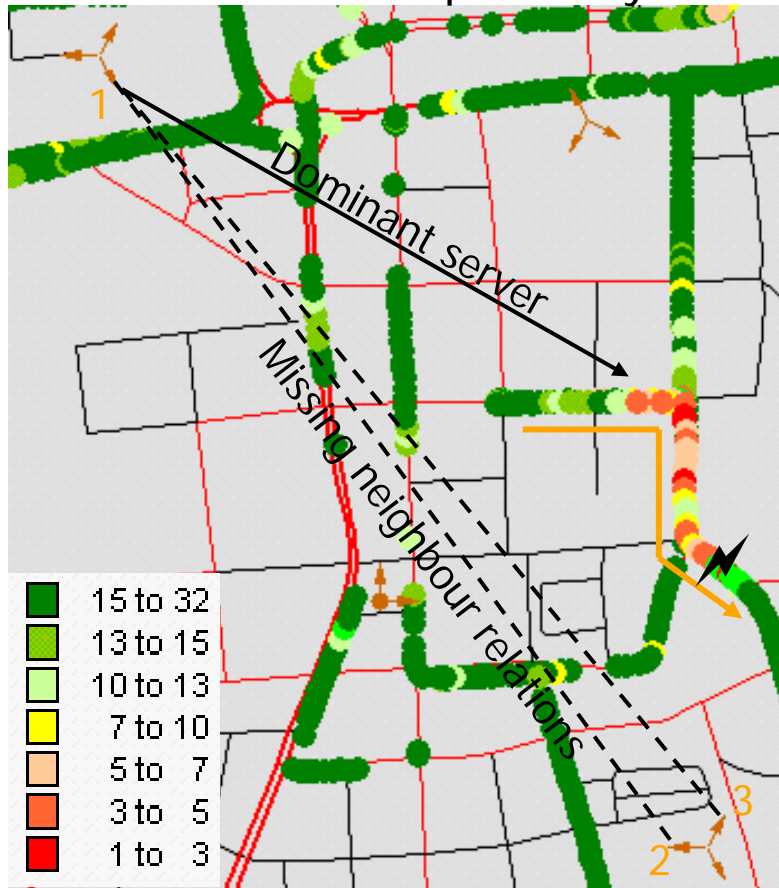
Good Coverage Essential

- Good RSCP for indoor coverage
- High Ec/No



Overshooter, Missing Neighbour

Median CQI values reported by mobile



- Cell 1 is overshooting
→ dominant server in active set
- No handovers to Cell 2 and 3
- E_c/N_0 drops → CQI drops → Throughput drops → drop call

Solution:

- Downtilt Cell 1
- or
- Add handovers

HSDPA Performance „The file is with you in 3 seconds“

- Hotspot, stationary indoor

- ftp peak: ~1.3 Mbps
- ftp mean: ~1.2 Mbps
- ftp uplink mean: ~250 kbps
- Round trip time: ~80 – 90 ms
- Activation time: ~3s

- Mobile outdoor drive tests

- ftp peak: ~1.3 Mbps
- ftp mean: ~1.1 Mbps
- ftp uplink mean: ~250 kbps
- Round trip time: ~130 ms
- Activation time: ~4s

MOBILES BREITBAND AB
€ 29,-/MONAT
INKLUSIVE 500 MB FAIR USE*

IN DREI SEKUNDEN
HAST DU'S DRÜBEN.

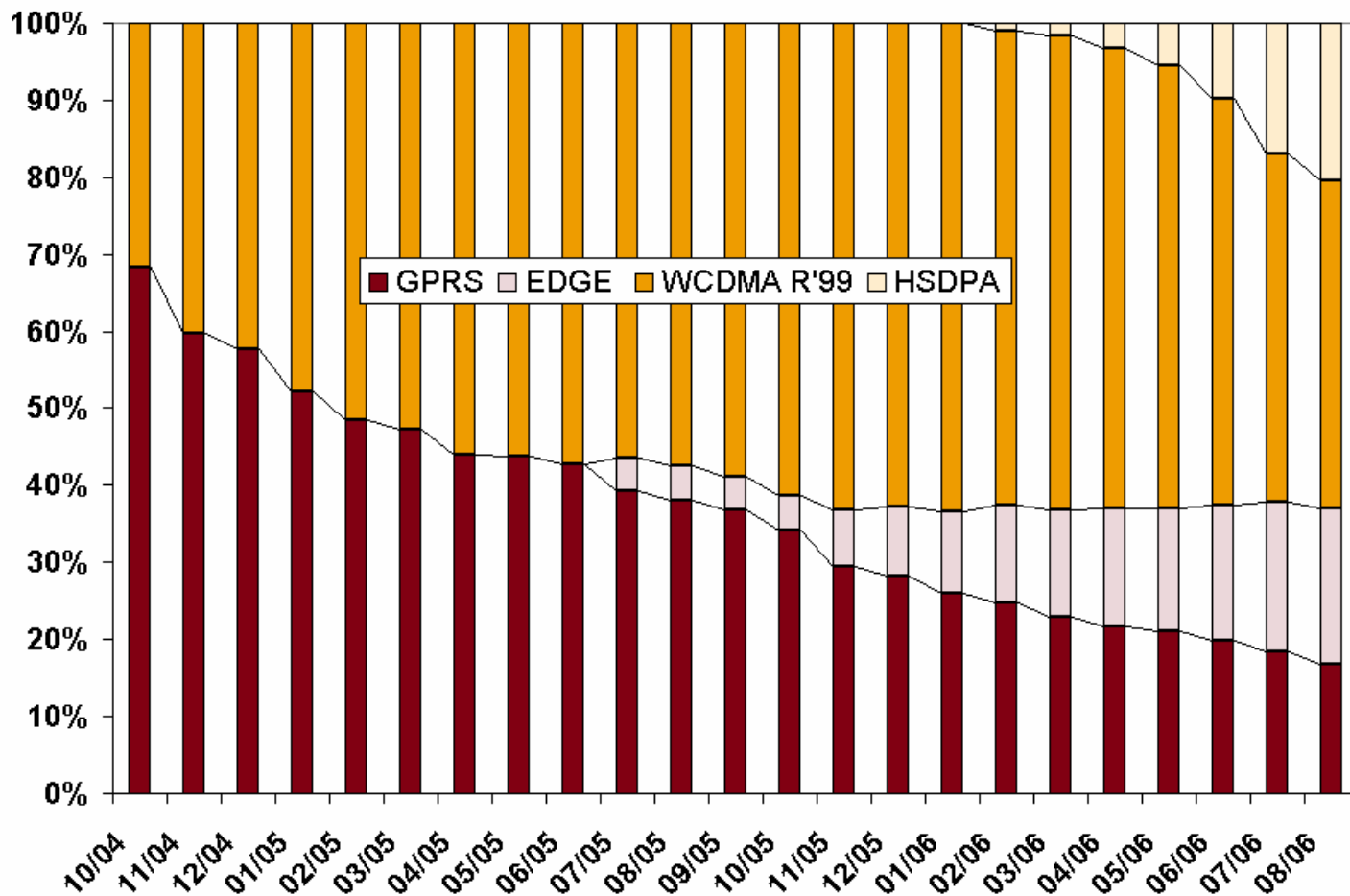
WIR VERBINDET, WAS SIE VERBINDET.
MIT MOBILEM HIGHSPEED-INTERNET
ÖSTERREICHWEIT FLÄCHENDECKEND.

Nur A1 verbindet Fläche und Highspeed so perfekt. Mit der neuen Vodafone Mobile Connect Card UMTS+EDGE ab €99,-** Weitere Infos erhalten Sie unter 0800 664 664 und www.a1.net/mobilesbreitband

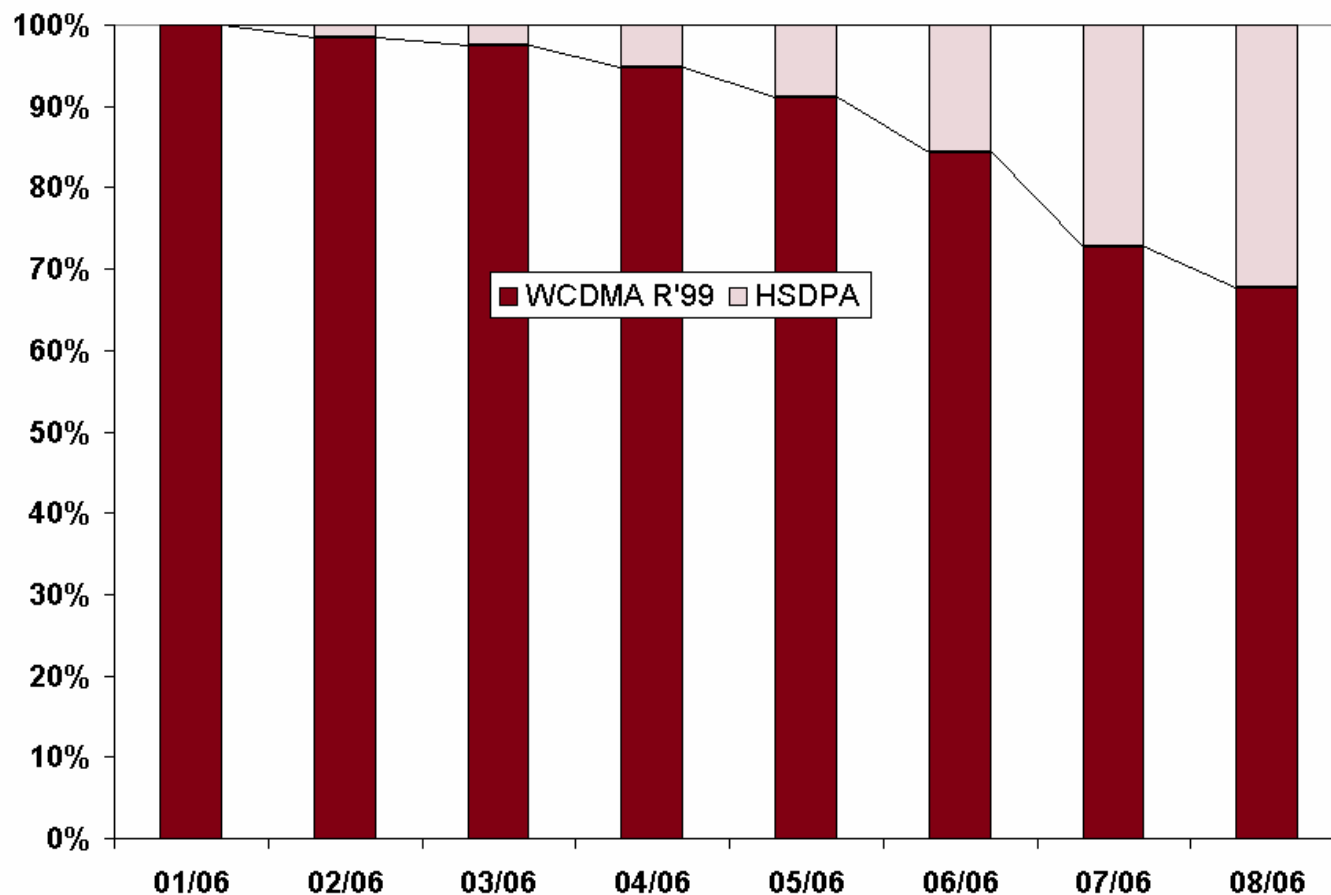
A1
vodafone

*500 MB plus zusätzlich 100 MB durch Fair-Use. Bei übererfüllung des im monatlichen Preispaket inkludierten Datenvolumens von mehr als 100 MB wird das gesamte 500 MB übersteigende Datenvolumen mit €0,50 je MB berechnet. €10,- Grundgebühren gelten für die ersten 21 Monate nach Abschluss zu €19,95 (inkl. MwSt) bis €19,95. Ab dem 22. Monat gelten bei Ersterhebung bis 21.02.2010 die hier nicht mehr gültigen Konditionen. **Gibt bei Ersterhebung bis 21.02.09 zu MOBILES BREITBAND. 24 Monate Restwertverpflichtung. Bei Beendigung des Vertrags vor Ablauf von 24 Monaten erhöht sich die Restpreissumme um €78,-. Beginn mit 1. Februar.

Downlink Data Technology Share



Downlink Data Technology Share



3G Learnings and Alternative Technologies

3G Learnings

- Mobile broadband / datacard really successful service enabled by WCDMA & complemented with EDGE (bit pipe!)
- Rapidly evolving standards – 1 major feature per year – HW upgrades
- Quality on packet assurance still not state of the art
- Low adoption of videotelephony in Europe
Austria: Videotelephony: Voice < 1 : 300
- Terminals
 - Still expensive
 - Battery life time still unsatisfactory 1/3 – 1/4 of 2G, 1 day quite normal
- Dominant usage inbuilding
- Site grids in Europe usually don't enable deep indoor coverage with broadband datarates

3G Challenges

- Strong competition
- For the first time in 2005, the successful data business contributed more to the revenues than SMS.
- Mobile Broadband – bit pipe – flat rate
- WCDMA / HSPA / LTE the right choice ?
- Key success factor is TCO
 - Cost for coverage
 - Cost for capacity
- Alternative radio access technologies ?

Broadband Radio Access in Austria

Wireless broadband access

450MHz
Auction in
Apr. 2006
~6M€

T-Mobile Austria
(FlashOFDM)
Green Networks
(cdma450)

mobikom
austria

EDGE

UMTS
Auction in
Nov. 2000
~832M€

FDD
WCDMA

mobikom austria
T-Mobile Austria
One
Hutchison

TDD

mobikom austria
T-Mobile Austria
Hutchison

WLAN

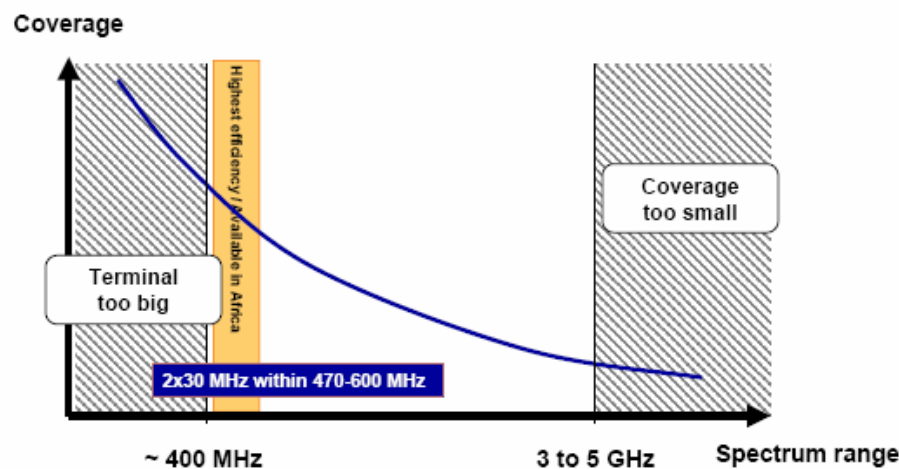
WiMAX
WLL 3.5GHz
Auction Oct. 2004
464k€

WiMAX Telecom
Telekom Austria
Telekabel

Technology Alternatives

- WCDMA / HSPA / LTE
- WiMAX
 - IEEE 802.16 – 2004
 - 3.5 GHz spectrum band.
 - IEEE 802.16e 2005 – “Mobile WiMAX”
 - 2.3 GHz, 2.5 GHz, 3.3 GHz, 3.4-3.8 GHz spectrum bands.
- 450 MHz
 - Significant coverage improvement, comp. to 2GHz
 - Fragmented
 - Too narrow for WCDMA
 - cdma450, FlashOFDM

Spectrum for mobile



IMPACT Meeting#10
Sophia Antipolis, 29 June 2006

Some Concern

- WiMAX IEEE 802.16 – 2004
 - ADSL substitute ok
 - Indoor coverage not profitable <- 3.5GHz
- Mobile WiMAX
 - Not yet available
 - Indoor coverage still challenging <- 2.5GHz
- 450MHz
 - Overlay network
 - Little amount of spectrum -> little capacity / cell splitting
 - Dependency on vendor
 - Different HW
- WCDMA in 900MHz band
 - Promising, free spectrum not readily available



Conclusion

- Mobile Broadband, enabled by HSDPA, warmly welcomed by market
- Bitpipe - critical success factor is costs
- 3GPP WCDMA/HSPA/LTE still most promising technology for mobile cellular in upcoming years

Thank you!