Offering 3G services in the 900 MHz Band

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Making Lives Better

The reasoning behind
US President Obama's US$6 billion support
for broadband rollout in underserved areas:

"For every dollar invested in broadband, the economy sees a ten-fold return on that investment."

- American Recovery and Reinvestment Bill, 2009

Source: wi-fiplanet.com, January 2009

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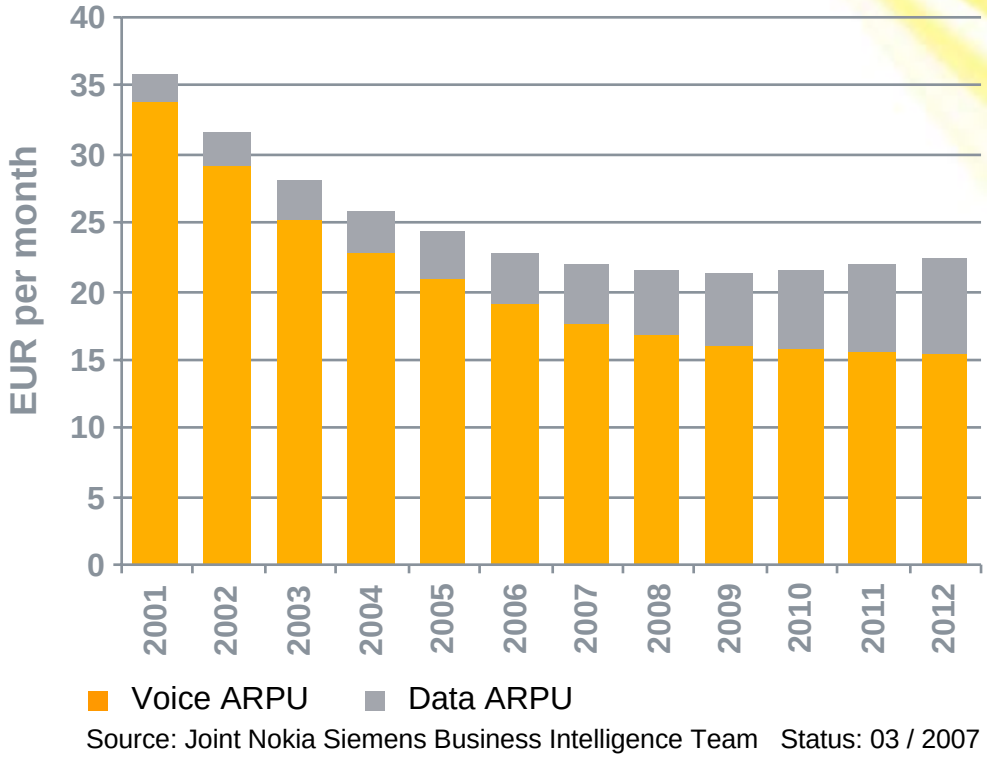
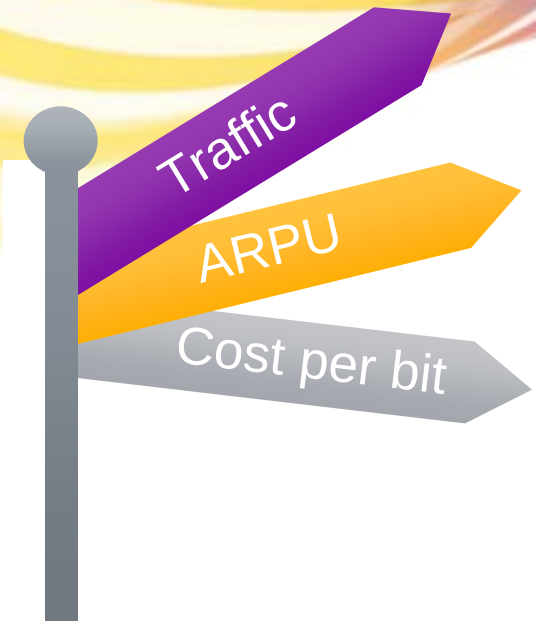
ARPU increasingly generated with data services



Source: Joint Nokia Siemens Business Intelligence Team Status: 03 / 2007



Key Success Factors:

- **Attractive new data services** to generate **additional revenues**
- **Improve Cost Position** for early ROI

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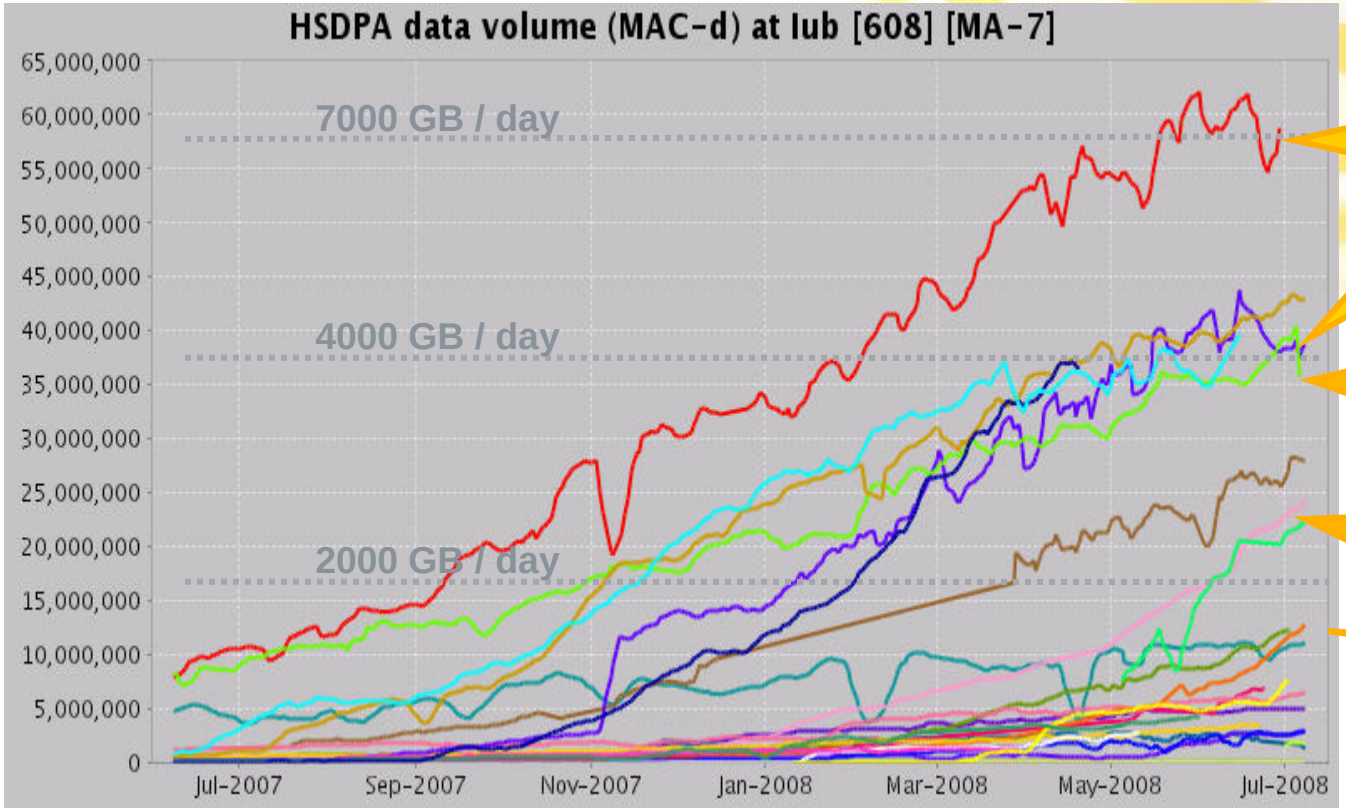
Data traffic and revenue keep growing

Comparison of HSDPA throughput July 07 – July 08



Source: NSN analysis

Operator in Europe: Data Revenue +10%

Operator in APAC: Data Revenue +16%

Operator in APAC: Data Revenue +24%

Operator in APAC: Data Revenue +10%

Operator in Europe: Data Revenue +10%

Source: Merril Lynch, Global Wireless Matrix Mar07-Mar08, local currencies

"3G drives data use, not the other way around"

-- Ovum, 2008

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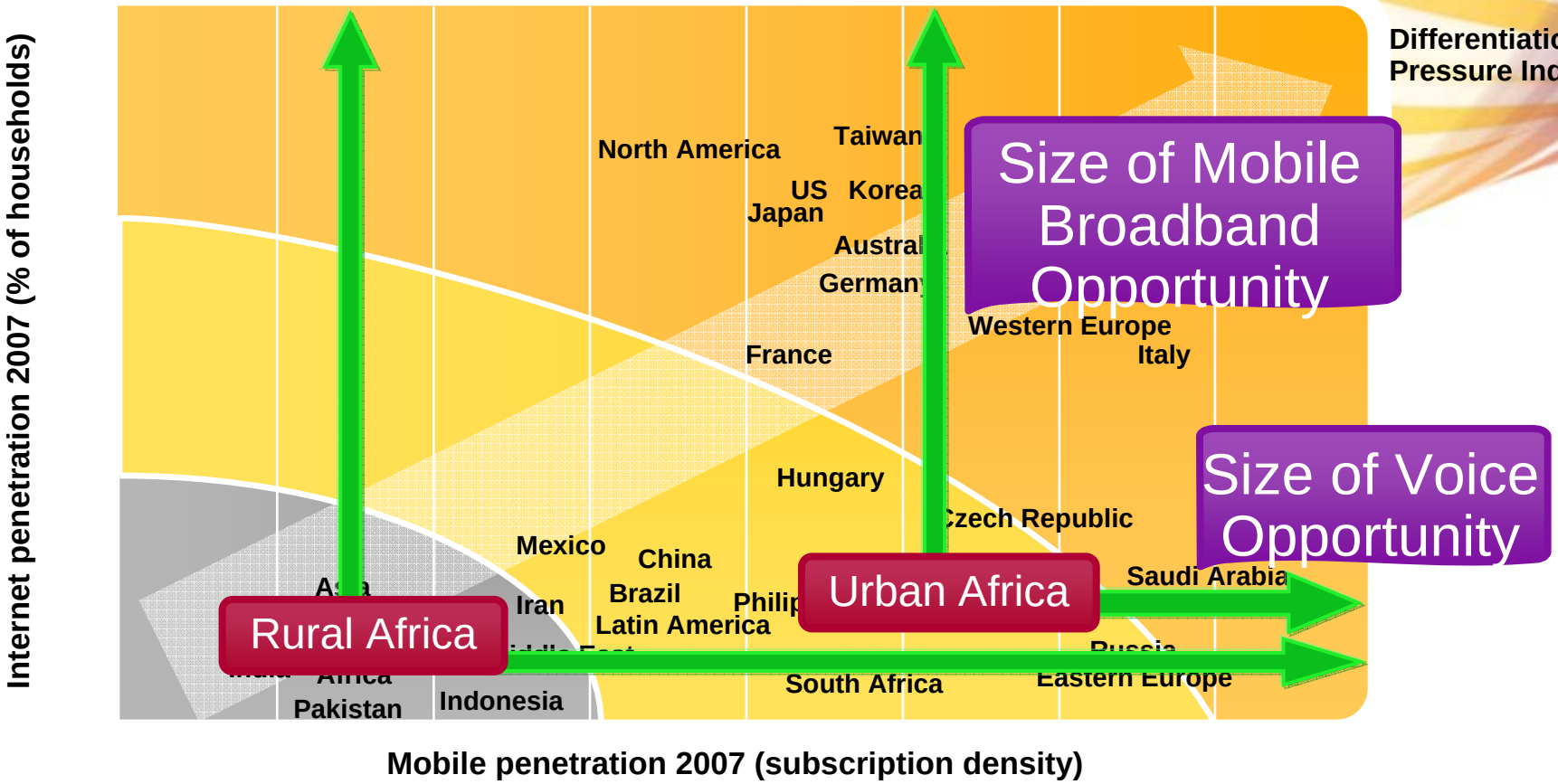
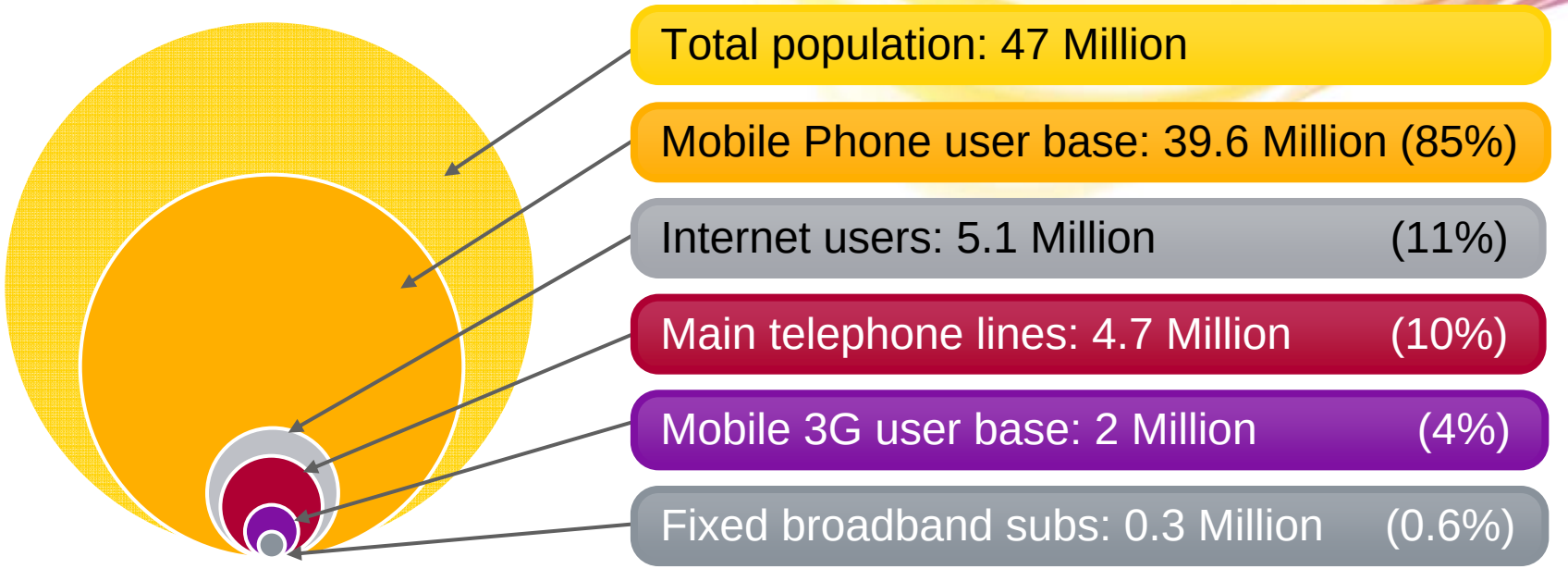
Satisfying the market's largest unmet need



Today's strongest opportunities for growth:

- **Voice for rural population**
- **Mobile broadband for urban dwellers**

Teledensity is still very low in comparison with South African population: Room to grow

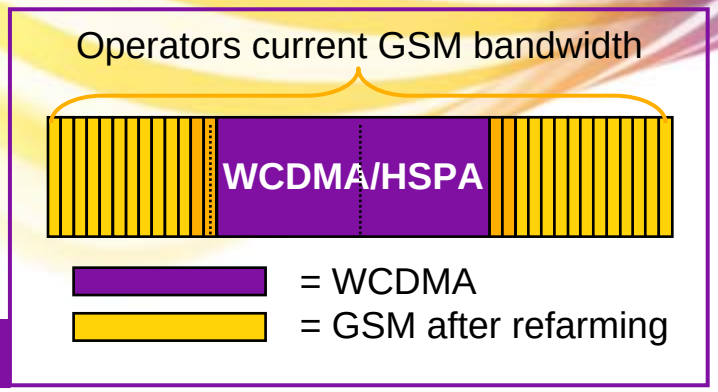


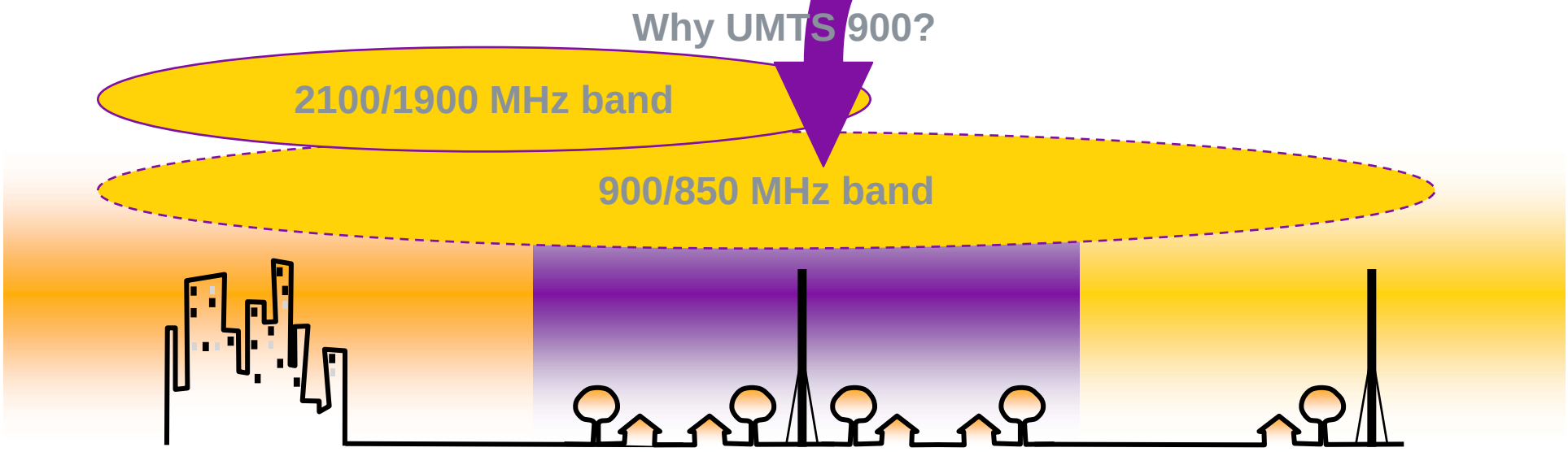
Fixed broadband subscribers only represent 6% of all internet users in the country

Source: ITU ICT Statistics 2006; NSN Market Compendium 2007; various public sources South Africa

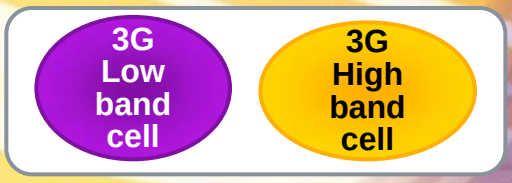
Addressing challenges with WCDMA Frequency Refarming

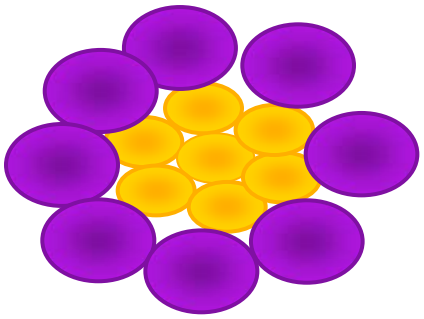
- Operator introduces 3G services into the frequency band that is already used for GSM
- In order to fit the WCDMA carrier into same bandwidth, typically spectrum efficiency needs to be improved





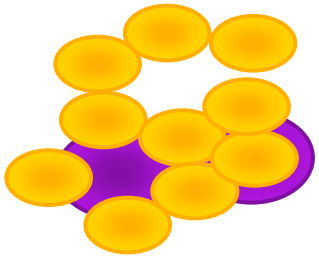
WCDMA at 900 MHz frequency – typical deployment scenarios





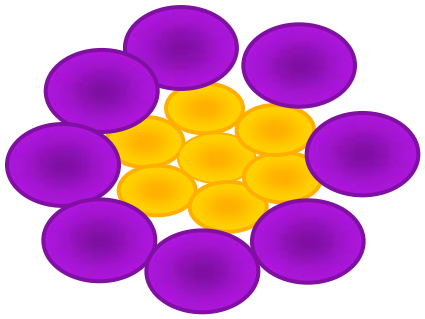
Sub-urban & rural coverage expansion

- Currently WCDMA services not yet available
- Easiest and most common approach
- Easier to release part of frequencies for WCDMA



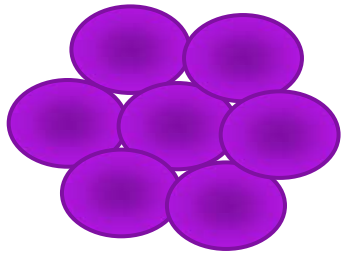
Urban 3G coverage improvement

- Fill-in and indoor coverage
- In many cases GSM traffic pushed to 1800 MHz layer



Wireless broadband for sub-urban & rural

- Currently poor or non-existing fixed broadband
- Data optimized 900 MHz layer with I-HSPA



Initial 3G roll-out

- Currently WCDMA services not yet available
- Logical approach to start with lower frequencies

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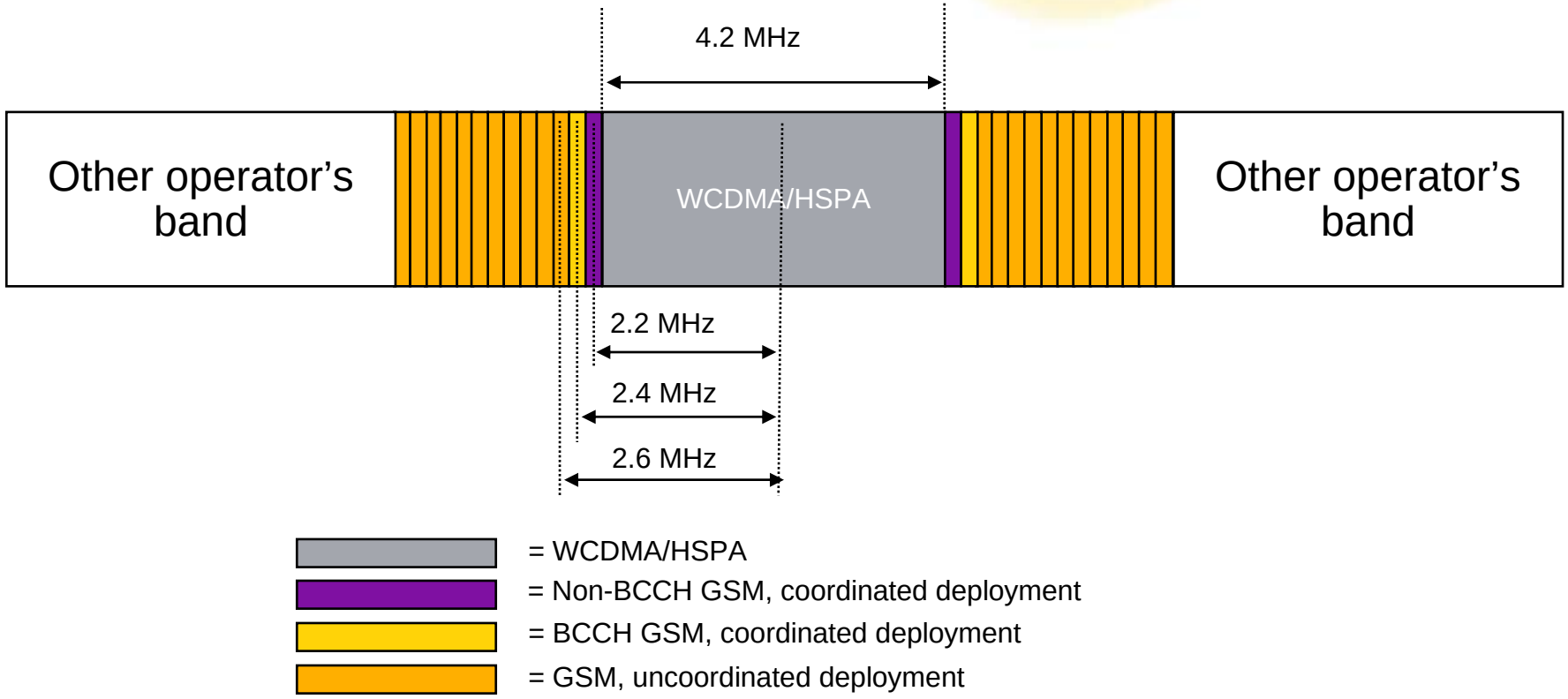
Sandwich-type frequency allocation recommended for efficient refarming

Closest frequencies at both sides of the WCDMA carrier can be optimally utilized for GSM frequencies

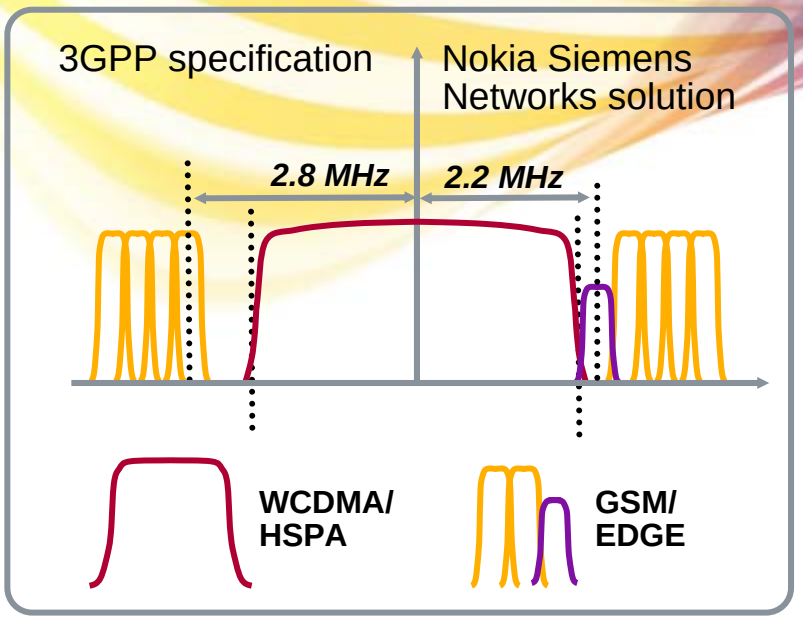
- Guard bands can be minimized with Flexi BTS 4.2 MHz filter and coordinated network deployment



Unique 4.2 MHz carrier bandwidth feature to ensure GSM capacity in WCDMA Refarming

Enable 1 additional TRX in GSM layer

- Enabled by advanced design of Flexi filter
- Supported with standard UEs
- Ensures high performance
  - WCDMA network capacity same as with 5 MHz
  - GSM and WCDMA network qualities remain high
- Tested in several field trials



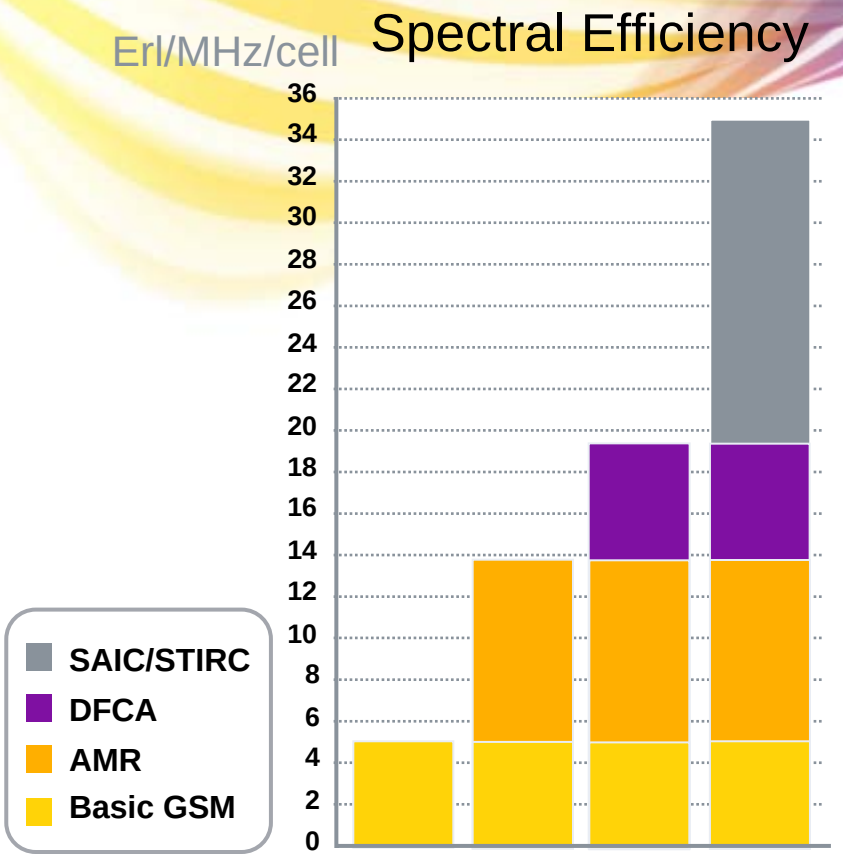
Example

	Nokia Siemens Network solution	Standard solution
WCDMA	1+1+1	1+1+1
GSM	2+2+2	1+1+1
AMR	4+4+4	3+3+3
AMR + DFCA	6+6+6	n/a

Minimize Needed Hardware and Sites with Spectral Efficiency Features

Spectral efficiency features enable considerable reduction in

- number of sites
- amount of site hardware
- site visits



SAIC = Single Antenna Interference Cancellation
STIRC = Space Time Interference Rejection Combining
DFCA =Dynamic Frequency Channel Allocation
AMR = Adaptive Multi Rate codecs

DFCA and STIRC are unique features for Nokia Siemens Networks

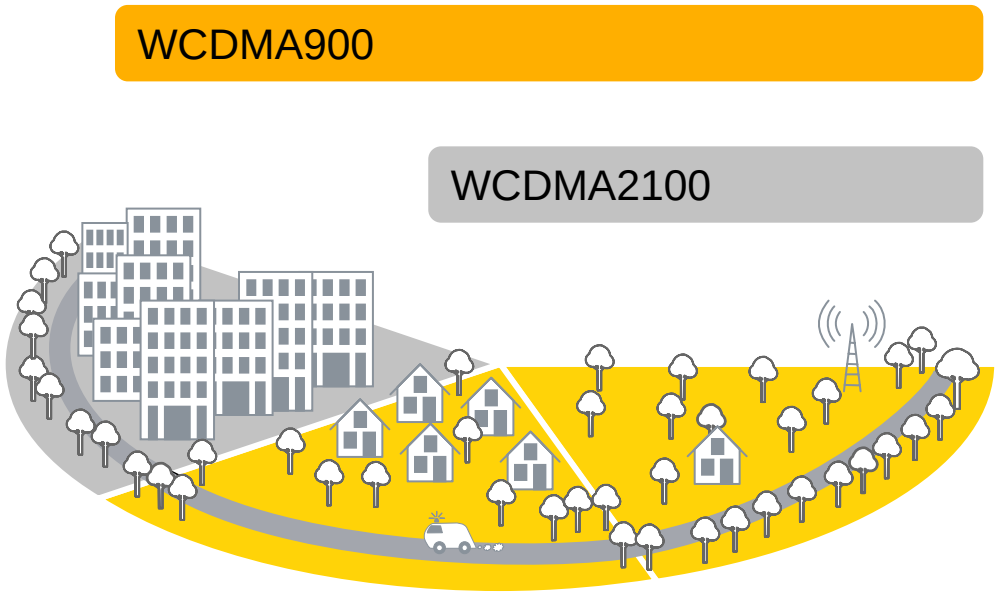
Reduced number of sites with WCDMA 900MHz Solution

Lower radio network CAPEX/OPEX and fast network deployment

- 65% less sites needed with WCDMA850 or 900 compared to WCDMA2100

In building 3G services without dedicated indoor systems

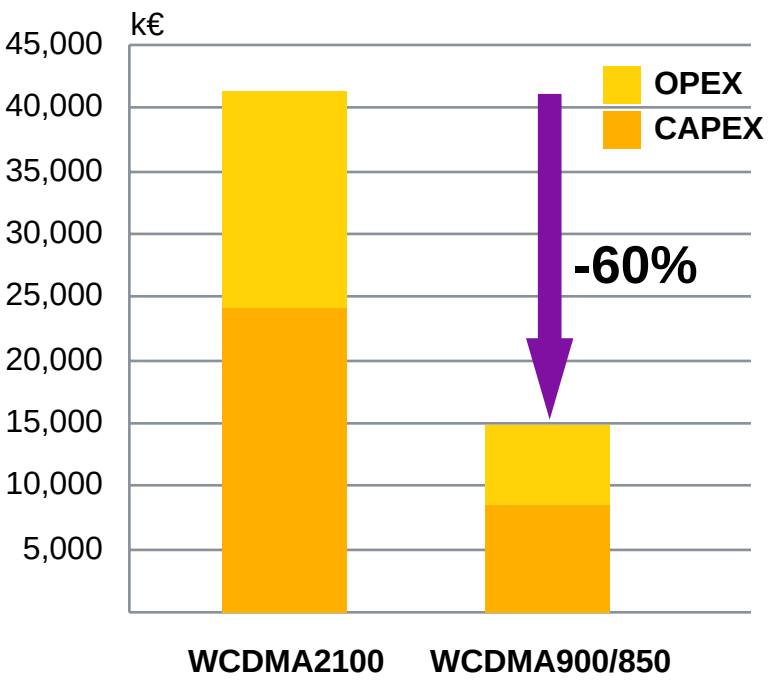
- 100% improvement with WCDMA and HSPA indoor data rates



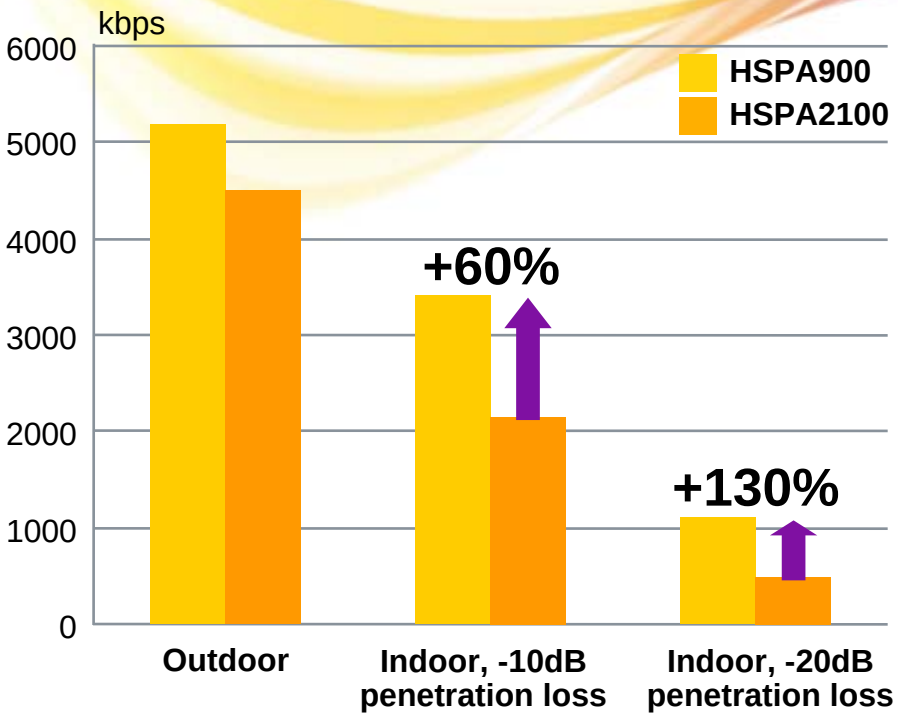
WCDMA850 & 900 gives 2.8 x larger cell coverage area than WCDMA2100

Value of WCDMA Refarming with Nokia Siemens Networks

Cost of rural coverage



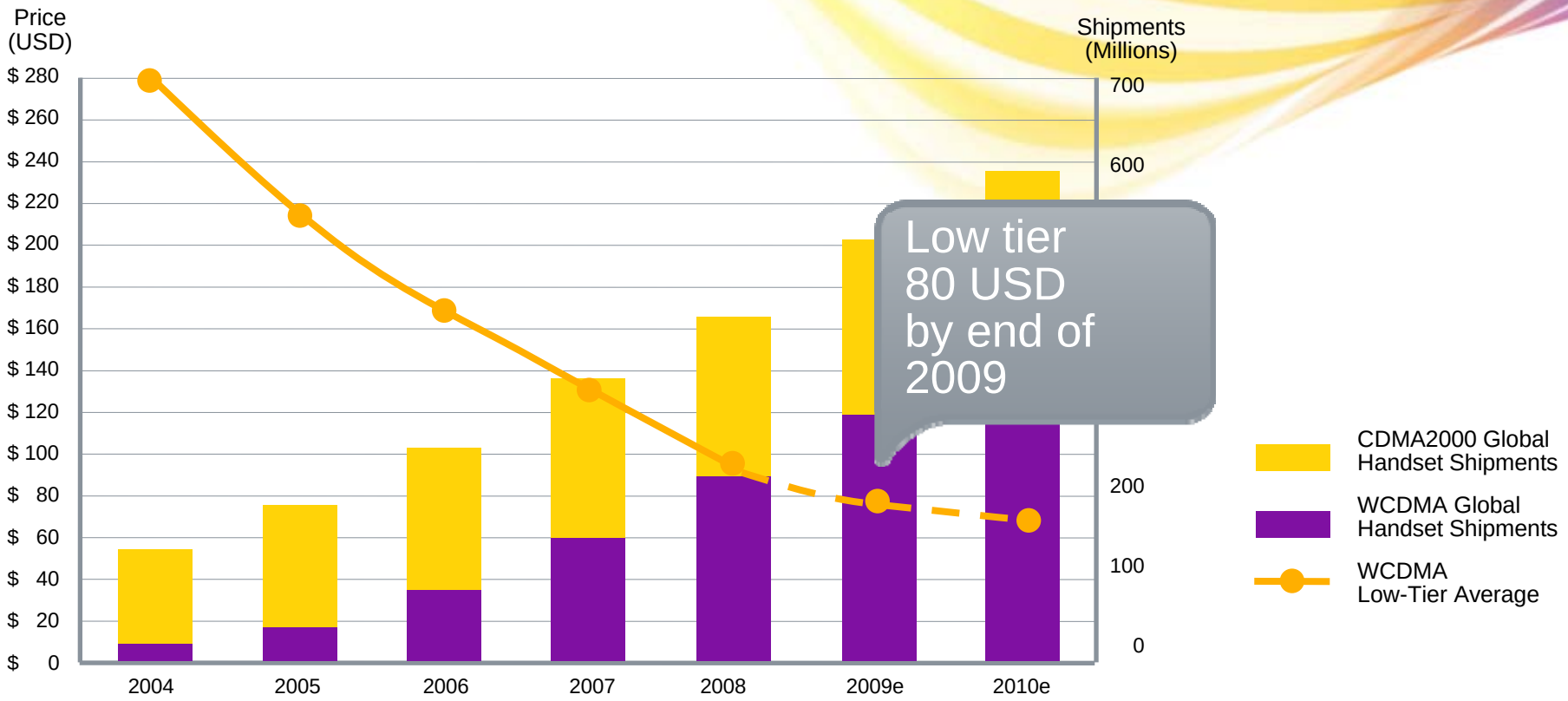
HSPA data rates



WCDMA900/850 triples the cell area in rural areas

HSPA900/850 boosts indoor data rates above 1 Mbps

Terminals
WCDMA terminal selling prices



Sources: ABI, IDC, Strategy Analytics and Yankee Group handset shipment forecasts

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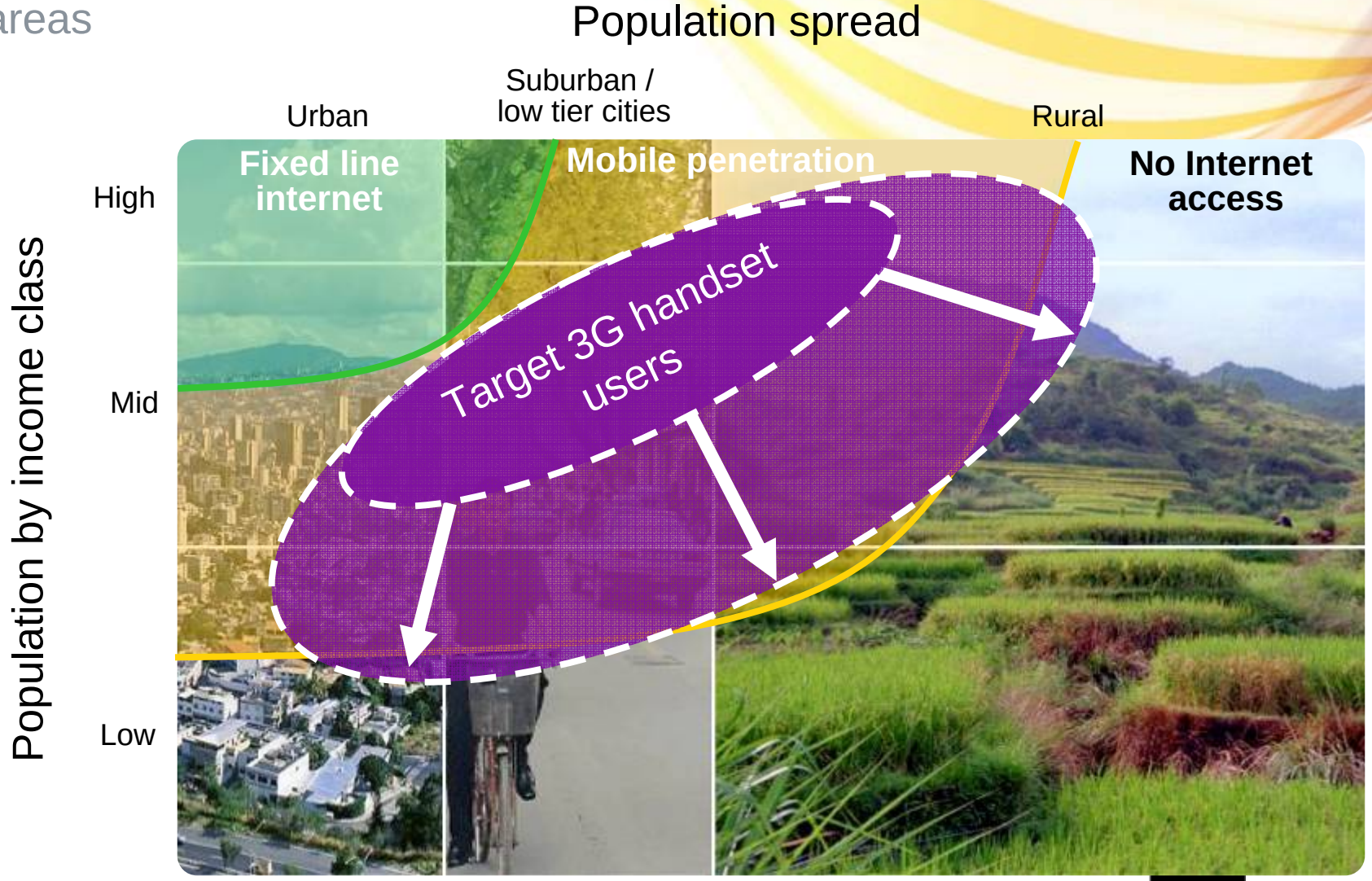
Terminals

Nokia's target consumers are mobile subscribers in low-tier urban and rural areas



Source: EMS R&D material 16-May-2008

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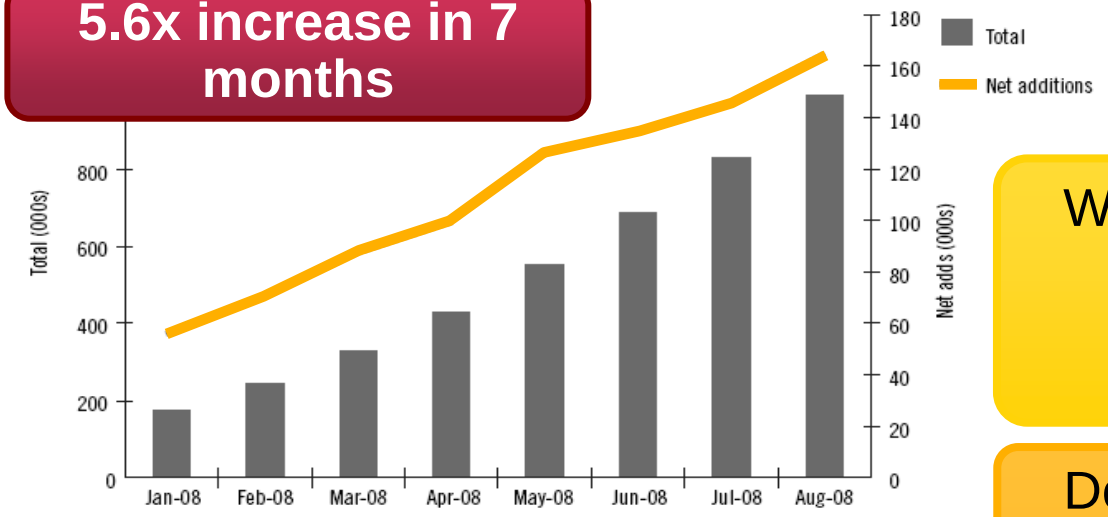
Mobile broadband growth driven by explosion of laptops with dongles

Figure 3.2: UK, mobile broadband subscriptions, Jan-08 to Aug-08

	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08
Total	175,000	244,000	330,000	428,000	553,000	686,000	830,000	993,000
Net additions	55,000	69,000	86,000	98,000	125,000	133,000	144,000	163,000

5.6x increase in 7 months



Source: Informa

With HSDPA, operators can market "mobile broadband" instead of "3G"

Dongle subscribers will usually have a mobile phone as well – this is almost entirely additional revenue

Unlike fixed broadband, mobile broadband's market is individual consumers, not households

Source: O

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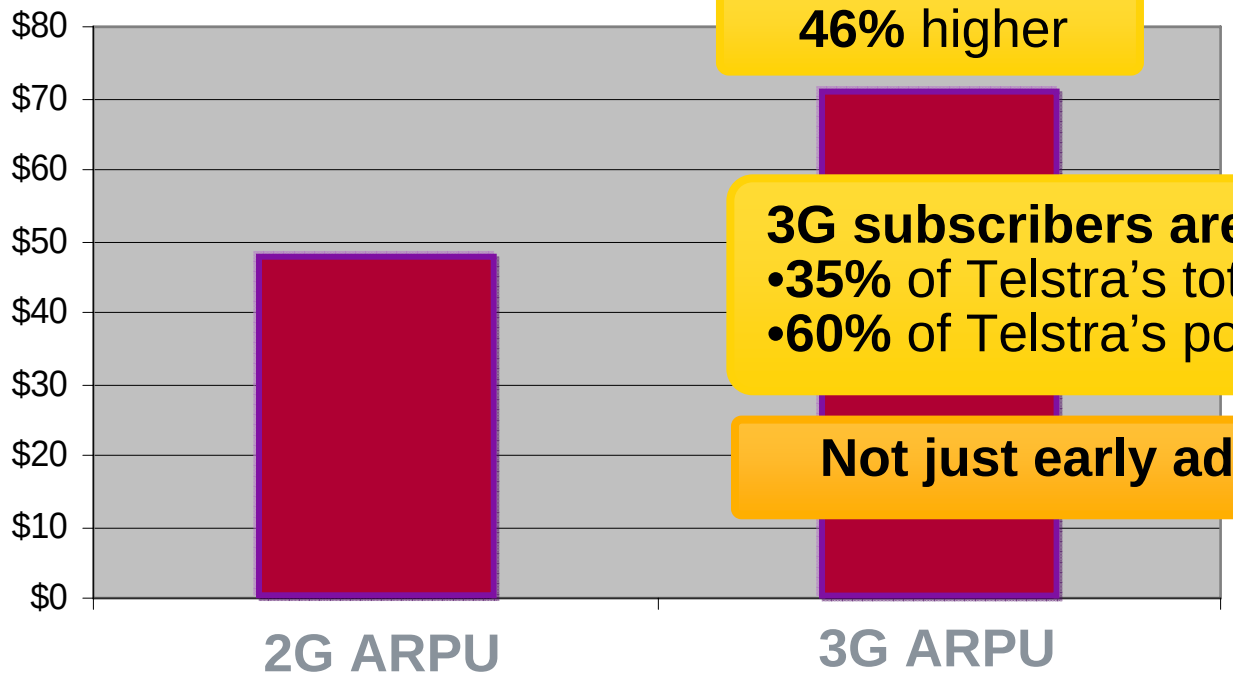
The case for 3G in developed markets
Telstra Australia: 3G effect on ARPU

Telstra postpaid ARPU at end 2007



46% higher

3G subscribers are:
- **35%** of Telstra's total subscriber base
- **60%** of Telstra's postpaid base

Not just early adopters any more!

Source: Ovum, 2008

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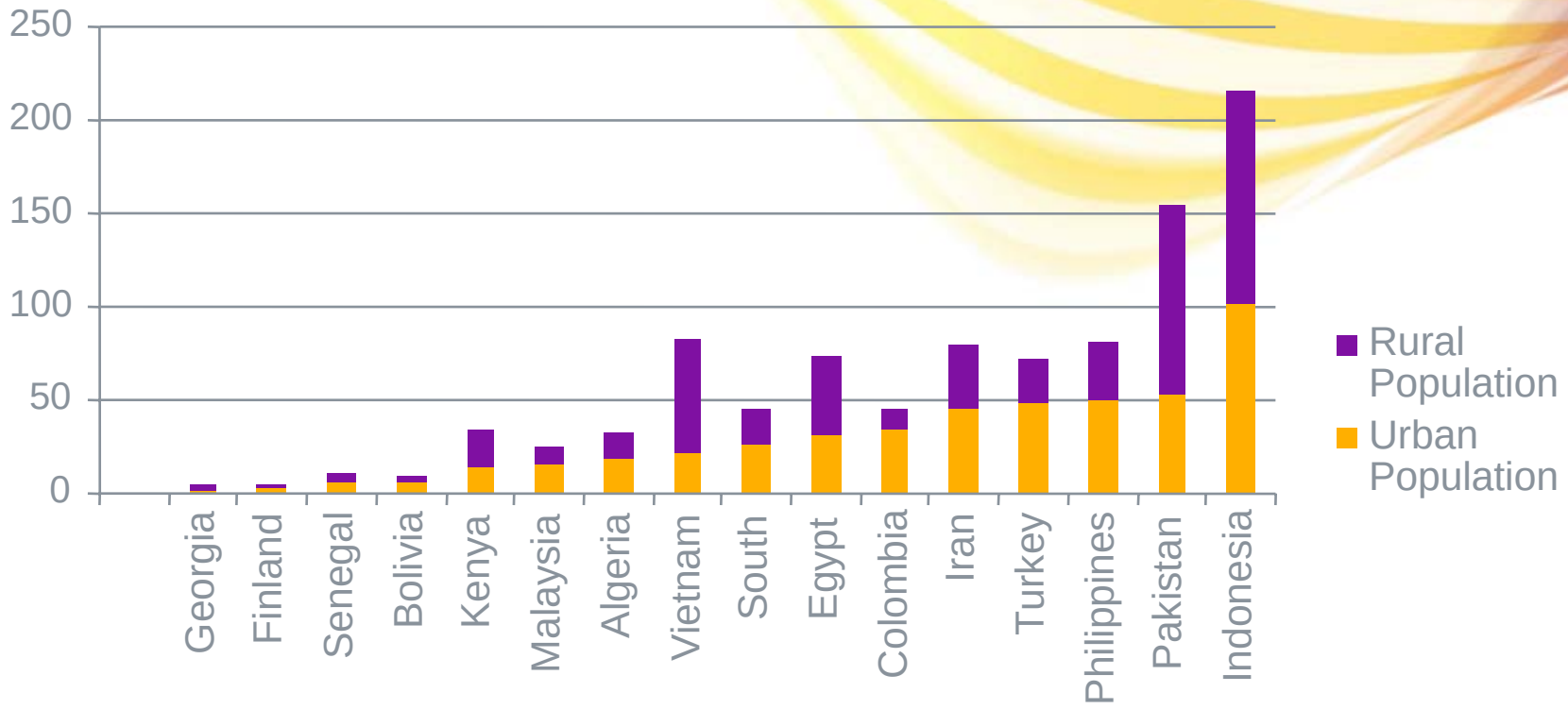
The Question:
Can this success be replicated in emerging markets?

Broadband for development



Finland's entire population of 5 million is exceeded by the urban population alone of most emerging nations – given the right approach, the potential market for 3G is there

Source: World Bank Development Indicators 2006

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Conclusions

WCDMA 900 MHz user equipments are arriving to market

Regulators moving towards technology neutral licenses and starting to allow WCDMA in 900 MHz

Already several operators are deploying WCDMA in 900/850 MHz

The challenge is how to successfully accommodate WCDMA into GSM band

Nokia Siemens Networks offer a complete e-2-e solution for efficient WCDMA Refarming

Thank you

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