



3G

Enabling Phone  
and Broadband  
Access for All

May 3-4, 2007

## Why Wana Selected CDMA ?

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## Why CDMA ?

- > Given the penetration of mobile communications in Morocco and the penetration of Fixed lines services ANRT decided about 3 years ago to push for the activation of WLL services that would allow rapid activation of voice services and Internet connectivity
- > To attract investors and stimulate the move towards high speed data service the regulator developed and interesting incentive for those who would deploy a nation wide WLL network: the full mobility and 3G license at a very attractive price
- > ANRT wanted to have a third verticalized nationwide operator able to compete across the board of telecom services with the two existing one for the benefit of users. The use of a different technology would add and additional twist to competition in favor of data connectivity that was aimed to accelerate 3G services in the country
- > Considering the amount of spectrum available at 800 MHz and the estimated price of the mobile license Wana assessed that the value proposition was very good and got involved



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## Frequency used and relative advantages





- > Wana has spectrum at 800 MHz and such spectrum will be sufficient to support both 2G and 3G service.
- > WCDMA/UMTS players will have the spectrum at 2.1GHz with an inherent higher cost. A nation wide coverage with UMTS at 2.1GHz would be prohibitive and therefore the service of GSM operators in Rural area will remain limited to the EDGE services
- > WCDMA may use the 900 bandwidth for rural coverage but this seems years away in the Moroccan situation
- > WCDMA data performance is not better than EDGE so the operators will have to install HSDPA and HSUPA as well to have similar performance the EVDO Rev A
- > As result of the above Wana has by far better performance using CDMA rather than UMTS and this should give Wana an objective advantage for some time



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# A Global Operator with one technology, one network ...

	Mobile 2G	Mobile 3G	Fixed	Internet
<b>Wana</b>	 <b>CDMA 2000</b>	 <b>CDMA 2000</b>	 <b>CDMA 2000</b>	 <b>CDMA 2000</b>
<b>Incumbent</b>	<b>GSM 900 MHz</b>	<b>UMTS 2.1 GHz</b>	<b>PSTN</b>	<b>DSL</b>

- One Technology
- One Frequency



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## Theoretical Cell Sizes (Voice)

Reverse link dominates coverage:

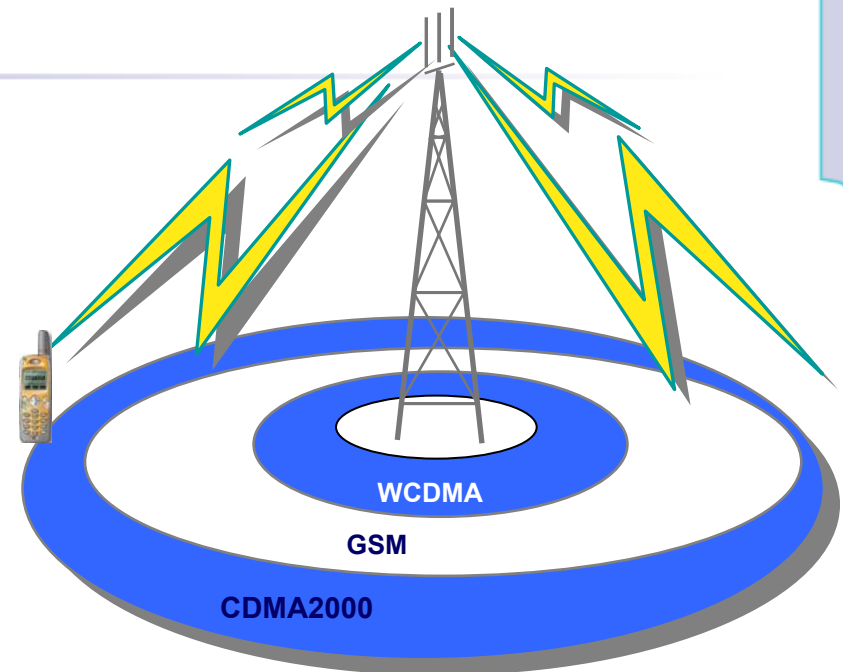
- Limiting link due to several issues

Link budget determines available margin required to achieve a high quality link

- Easy to compare technologies

Difference in coverage is affected by a variety of factors, including:

- Morphology
- Tower height
- H/W and rate set assumptions, etc.



### Nominal cell radius

(Rural area)

	<u>Freq. (MHz)</u>	<u>Radius (km)</u>	<u>Area (km<sup>2</sup>)</u>	<u>BTS Count</u>
WCDMA	2100	13.3	553	13.6
GSM	900	26.9	2269	3.3
CDMA2000	800	29.4	2712	2.8
CDMA 2000	450	48.9	7521	1

Lower Frequencies Provide Greater Coverage and Reduce Base Stations



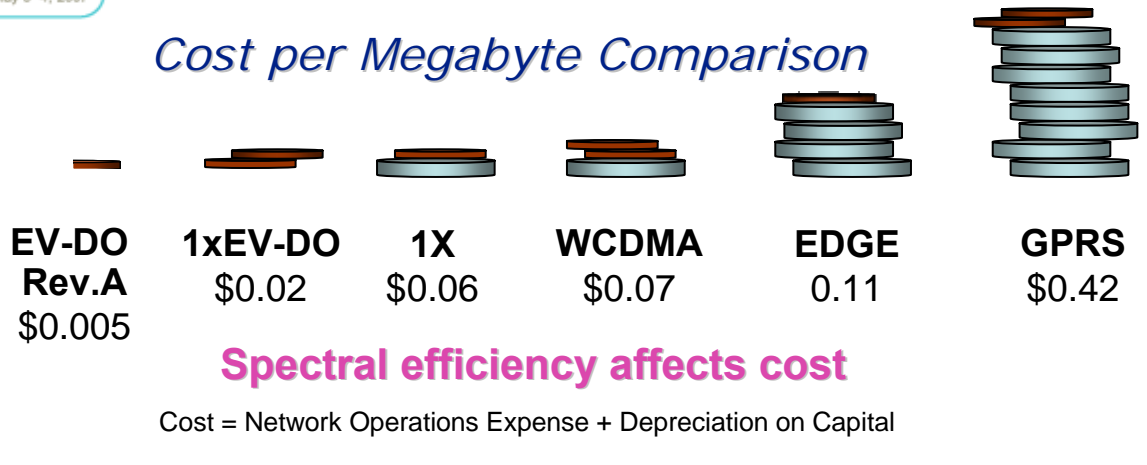
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# Data Throughput Comparison

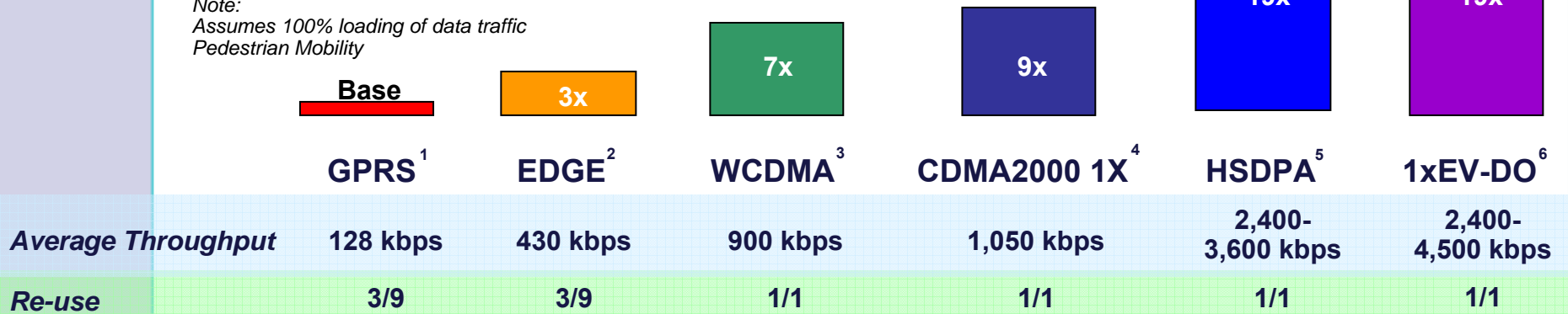
## Data Throughput Comparison

### Cost per Megabyte Comparison



### (Average Throughput per Sector in 5 MHz)

Note:  
Assumes 100% loading of data traffic  
Pedestrian Mobility



1 Assumes 4 time slots @ 12kbps per slot, 3/9 reuse, CS-3 coding scheme maximum (average C/I of 12dB)

2 Source: "EDGE TECHNOLOGY: AN ASSESSMENT" QUALCOMM Internal Paper: Rao Yallapragada

3 Source: "Understanding the Capacity - Coverage Trade-off" Peter Muszynski, Senior Research Manager, Nokia Networks - The GSM World Congress 2000

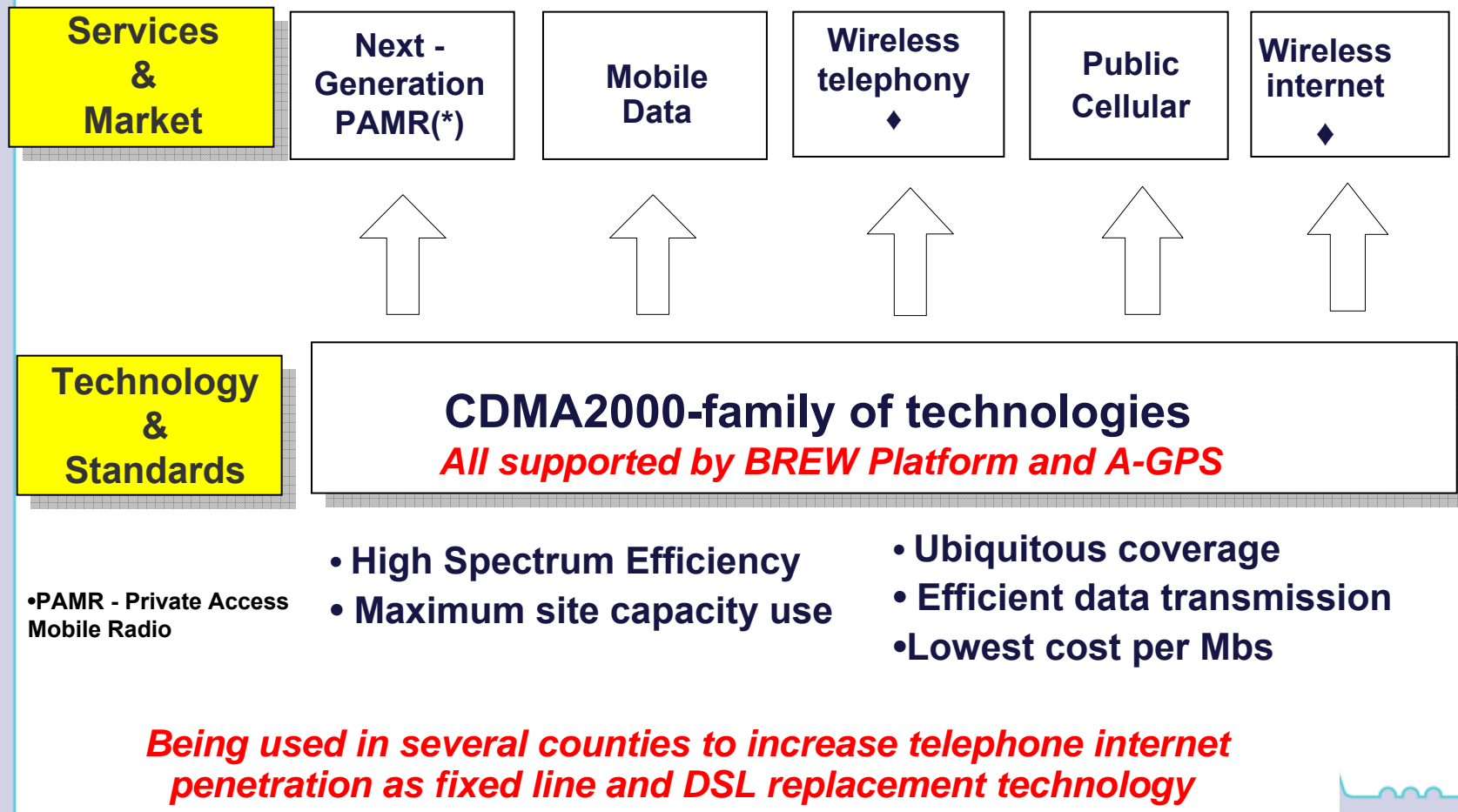
4-6 QUALCOMM Simulations



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# CDMA provides a platform for a number of services



•PAMR - Private Access  
Mobile Radio

- High Spectrum Efficiency
- Maximum site capacity use

- Ubiquitous coverage
- Efficient data transmission
- Lowest cost per Mbs

*Being used in several counties to increase telephone internet penetration as fixed line and DSL replacement technology*