

ITU/BDT International seminar, Kenya

Achieving Social & Economical goals with 3G Technologies

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Presentation theme

- How to achieve Social & Economic development goals with 3G
 - Experience of working on some projects in developing countries
- Technology comparison
 - Which technology is better under certain conditions
- Economic comparison of available technologies
 - Service affordability & profitability
- Provide options for developing countries
 - Technology of choice
 - Fixed/Mobile services
- Case studies: Network Economics
 1. Technology comparison: Capacity
 2. Techno-Economical analysis: cost per minute & megabyte
 3. Technology based competition: impact on Cost per minute
- CDMA 2000: key benefits

Social & Economic development goals & 3G

- Contribution of Telecoms in achieving Social & Economic development goals
- Barriers to increase in tele-density
 - Economic barriers
 - Cost of entry: Operator and consumer
 - Affordability
 - Profitability
 - Technical barriers
 - What is the most efficient technology for my market?
 - Regulatory uncertainties
 - WLL Limited mobility Vs Mobile services
 - Operating telecom networks
 - Experience, operating partners

} **Low cost voice & Data**

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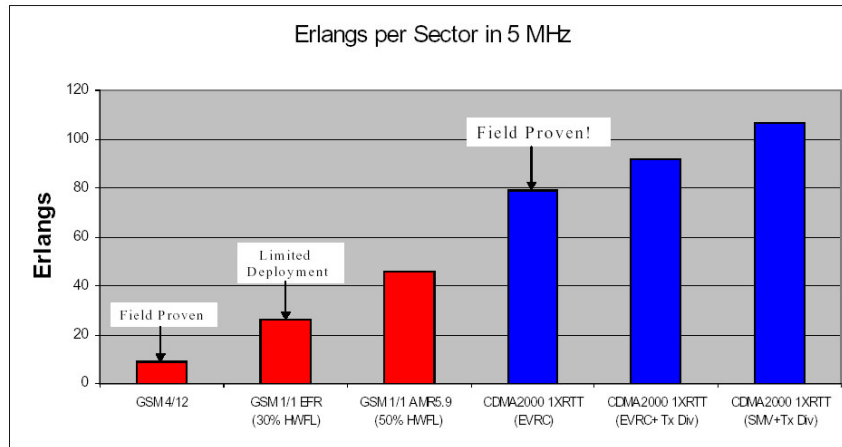
Technology comparison

- How can I maximise the return on investment in my network
 - Support 'more calls'
 - Lower price for increase service take rate
 - Lower cost of operation
 - Maximise profit potential
 - Support 'more data'
 - Become an ISP of choice
 - High speed data
- 3G CDMA technologies can help achieve these goals more effectively than alternatives
 - Cost efficiencies compared to 2G technologies

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Voice Capacity and Spectral Efficiency

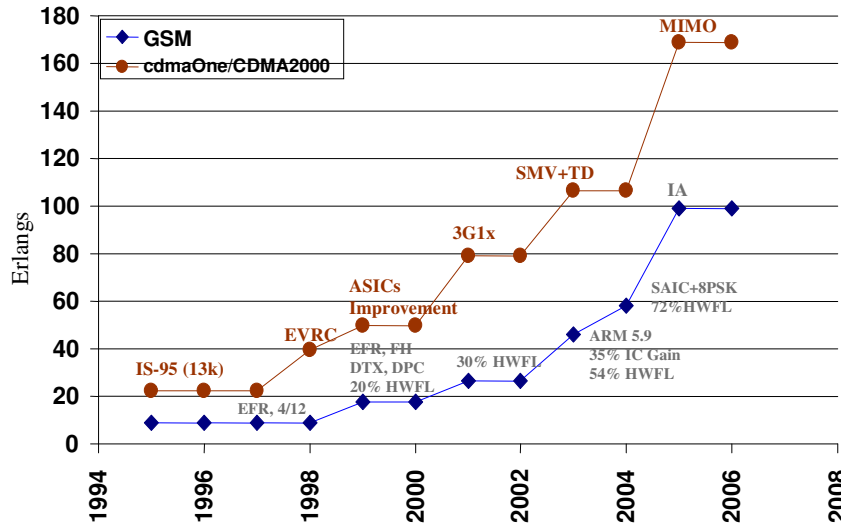
Compared in 5MHz normalized bandwidth



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Evolution of Voice Capacity

Compared in 5MHz normalized bandwidth



Year	2001	2002	2003	2004	2005	2006
Capacity benefit of CDMA2000	200%	200%	132%	83%	71%	71%

Data Capacity

Compared in 5MHz normalized bandwidth

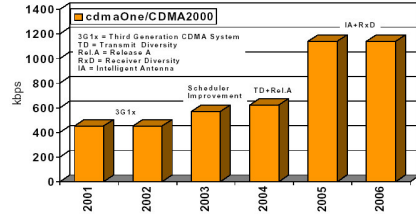
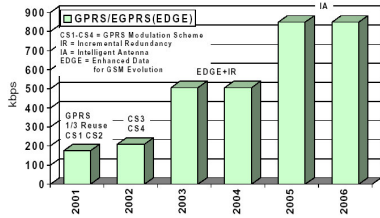


Figure 6. Technology and aggregate throughput performance evolution of CDMA2000 1xRTT in 5 MHz².

- Aggregate Throughput advantage of CDMA2000 1xRTT/1xEV-DO compared to GPRS/EGPRS over time.

Year	2001	2002	2003	2004	2005	2006
Aggregate Throughput benefit of CDMA2000 1xRTT/1xEV-DO	157%	114%	434%	434%	218%	324%

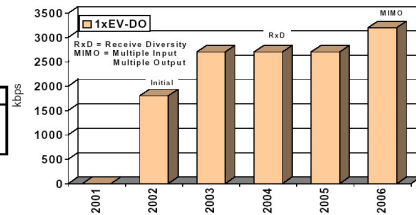
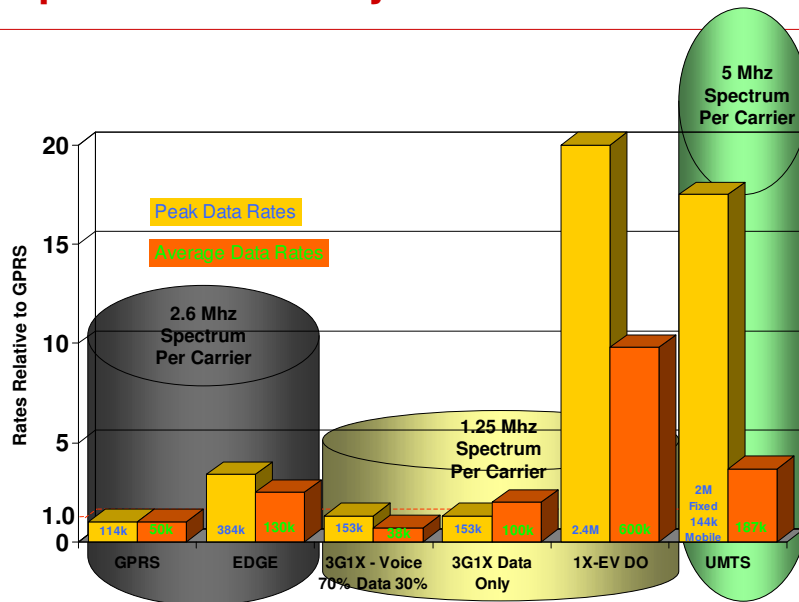


Figure 7. Technology and aggregate throughput performance evolution of CDMA2000 1xEV-DO in 5 MHz.

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Spectral Efficiency



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The Dashboard

	Spread Spectrum	GSM/GPRS	EDGE/GPRS	1xEV-DO	OFDM
Spectral Efficient	•Best	Low	Fair	•Best	•Good
Security	•Highest	Low	Low	•Highest	•Fair
Data Rates	•153.6-384	20	200	•400-1.2	•400-1.2
Voice Capacity	•Best	Low	Low	None	None
Data Quality	•Fair	Low	•Fair	•Best	•Good
Voice Quality	•Best	Low	Low	•None	None
Standard	•3G	2G	•3G	•3G	None
Deployed	•Yes	•Yes	•Yes	•Yes	No

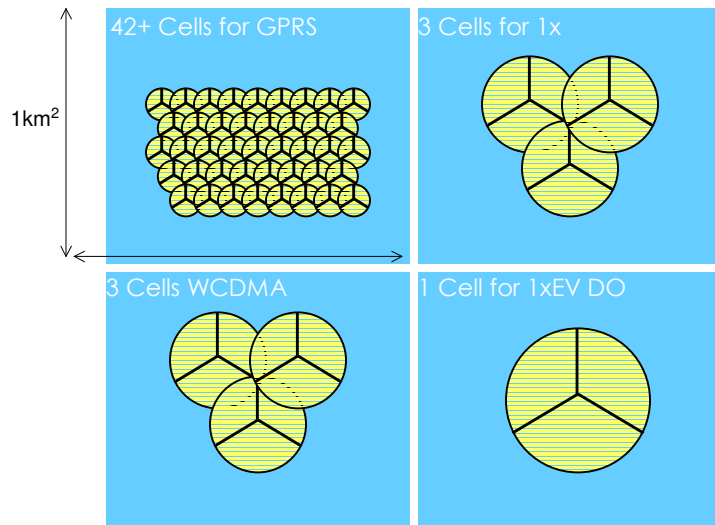
Key:
■ Best
■ Fair
■ Poor

The CDMA Spread Spectrum – Clearly Leading the Way

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Cell Count/Sq Kilometer for Dense Data Traffic.

Assuming all using same frequency band providing 3.28Mbit capacity in 1km².



Source: Qualcomm (The Economic of Wireless Data report)

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What does this all mean?

- 3G gives you
 - More voice capacity
 - Higher data capacity
 - Lower CAPEX
 - Lower network related OPEX
 - Non network related OPEX may not change
 - Lower infrastructure cost
- Lower cost to operator
•Lower prices for user
- Lower cost of ownership

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Case studies

CDMA2000 Capacity Efficiency

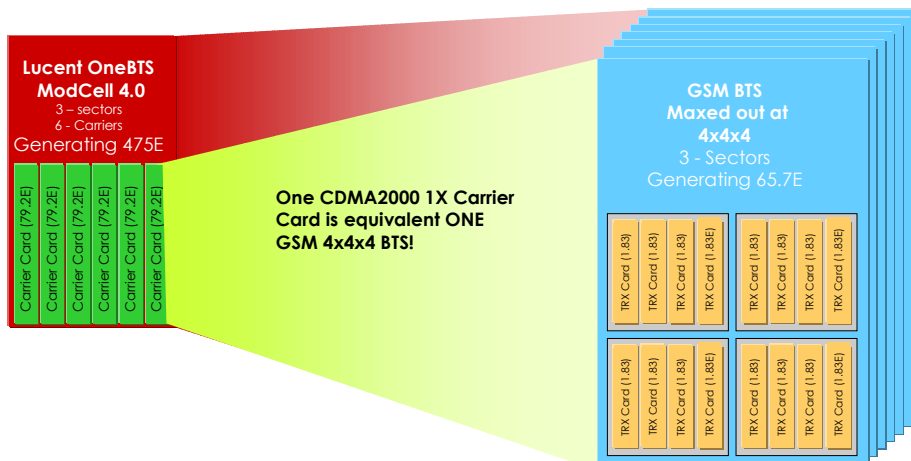
Case study 1

comparing the capacity offered by CDMA & GSM

- Cost per Erlang
- Cost per Subscriber

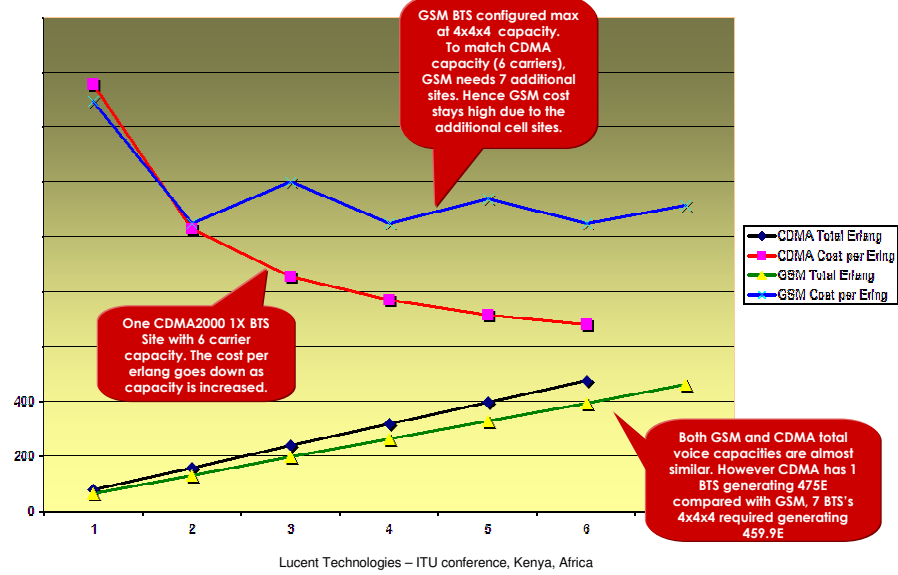


CDMA2000 Capacity Benefits – Example.

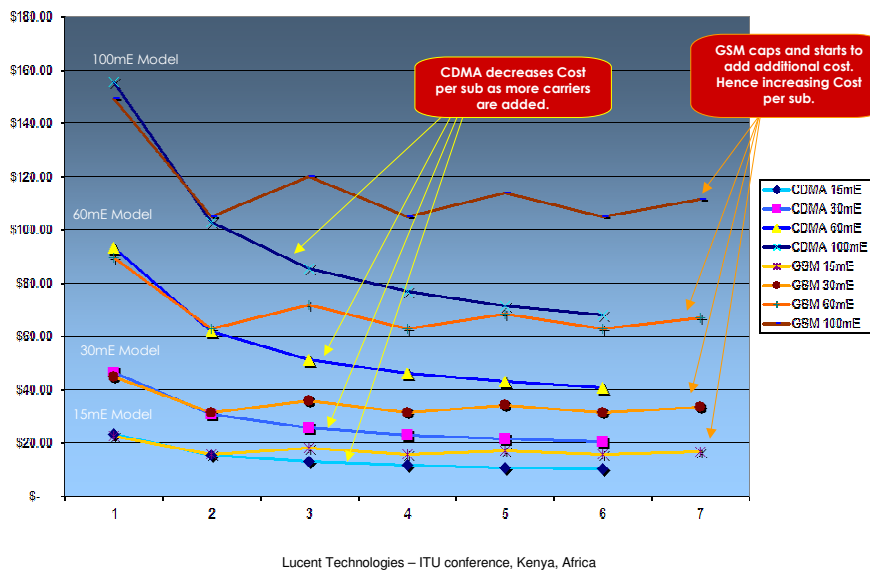


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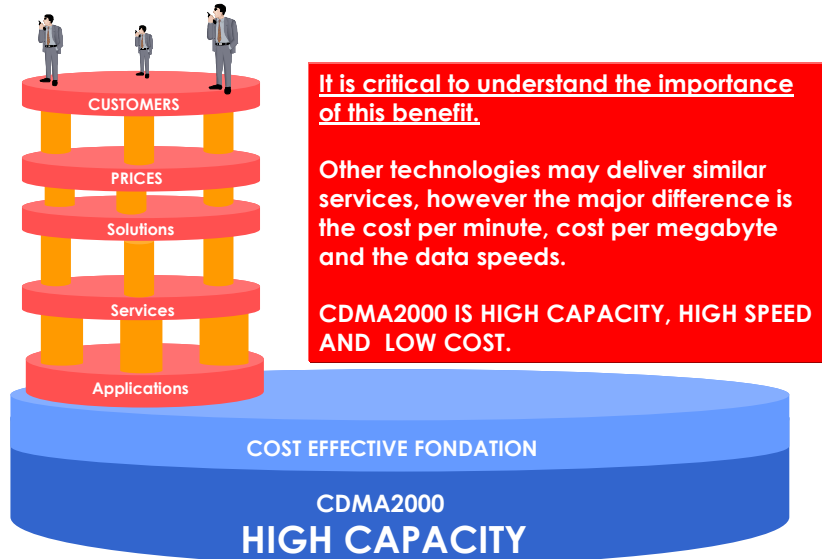
Cost Per Erlang Comparison based on 6 Carriers.



Cost Per Sub Comparison Up to 6 carriers.

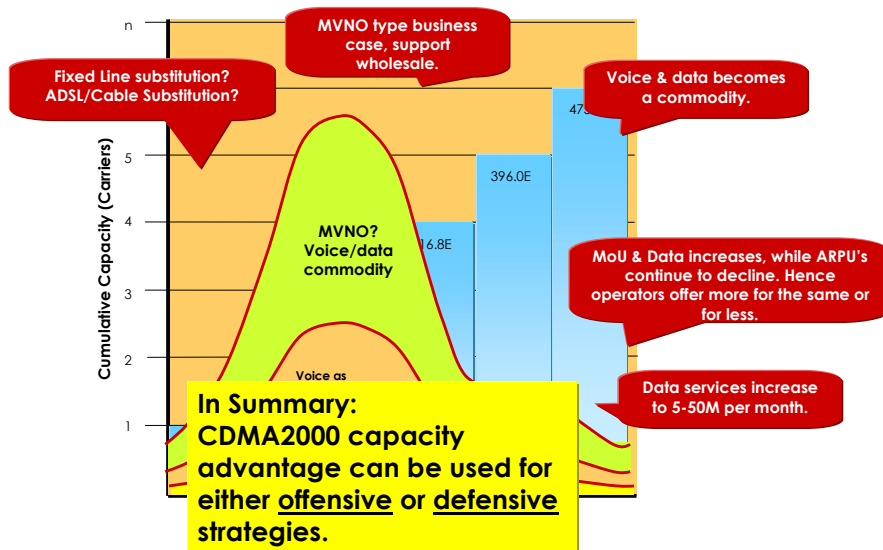


In summary, CDMA2000 Provides Excellent Cost Efficiencies.



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Why do we need all that capacity?



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Cost Per Minute and Per MByte Calculation

Case study 2

For an African country

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Assumptions for CAPEX Calculation (An Example in the Region)

Assumptions

- 5 Year Period
- Nationwide Deployment in 1 year
- Number of Subscribers assumed 2.5 M (234K, 821K, 1.3M, 1.8M and 2.5M in 5 Years)
 - Each Use 5 Mbytes per Month
- Voice Traffic per Subscriber assumed 15 mE (385 minutes Per Month)
- Number of Subscribers using EVDO High Speed Data assumed 400K
 - Each Use 250 Mbytes per Month
- Country-wide coverage using CDMA 850MHz network
 - With Hotspots with EVDO coverage as well
- Number of BTS 750
 - All equipped with 1x carrier
 - Out of 750 BTS, 403 BTS are equipped with EVDO modems and Carrier
- 4 MSCs

Assumptions for CAPEX Calculation

- 100% Subscribers subscribing SMS
- 30% Subscribers subscribing VMS
- 25% are Post Paid Subscribers
- Remaining 75% are Pre-Paid Subscribers
- Existing sites used

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Entities Included to calculate the cost of the Network

- 750 BTS (all equipped with 1-1x carrier and 403 equipped with 1-1xEVDO carrier)
- 4 MSCs
- 1 SMSC
- 1 VMS
- EVDO RNC, PDSN, Data Core
- 1 Pre-Paid System
- Billing, Mediation and Customer Care
- Transmission
- BTS Power Antenna and Cable
- MSC Power
- Services

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Calculation

Cost Per Minute and MB	
Total Voice Erlangs in the network	37,500
Voice minutes per Sub in a month	386
Total Voice Minutes of traffic in the network per year	11,571,428,571
1x Data per sub per month (MB)	5
1x EVDO Data per sub per month (MB)	250
Total Data traffic per year (MB)	1,324,500,000
Cost per Voice Minute	\$ 0.01
Cost of MB of Data	\$ 0.05

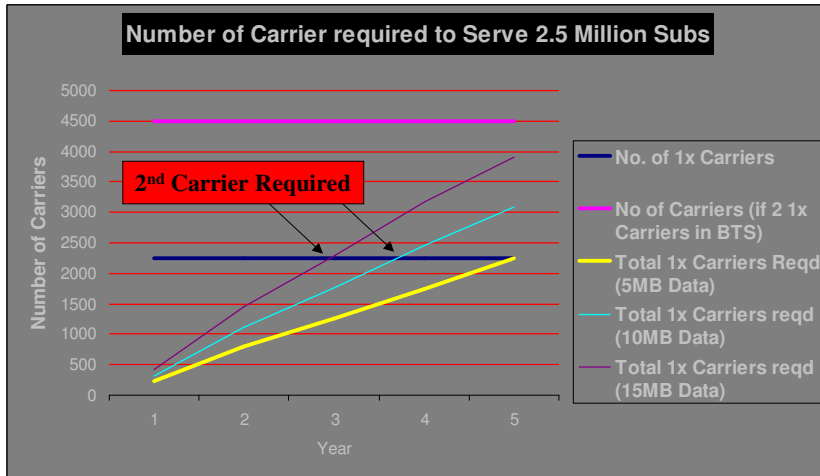
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Calculation

Cost Per Minute and MB (5 Year Period)	
Total Voice Erlangs in the network	37,500
Voice minutes per Sub in a month	386
Total Voice Minutes of traffic in the network in 5 Years	57,857,142,857
1x Data per sub per month (MB)	5
1x EVDO Data per sub per month (MB)	250
Total Data traffic per year (MB)	6,622,500,000
Cost per Voice Minute	\$ 0.002
Cost of MB of Data	\$ 0.01

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Capacity Requirements and Offered in a 3 Sected 750 BTS Network



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Impact of technology competition on consumer Cost per minute study

Case study 3

Study on countries with 1, 2 or more wireless technologies

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Methodology (1)

- Cost per minute is the metric used to measure the economic benefits to the consumers
 - If the cost per minute drops more in countries that allow more than one technology compared with those that do not, then there is an economic benefit of allowing more than one technologies
- Investigated the cost per minute of 40 countries around the world in the following regions
 - North America, Europe, Central & Eastern Europe, Asia Pac, South America
- Compared the cost per minute for markets with:
 - One technology, e.g. GSM only
 - More than one technologies, e.g GSM, CDMA, Phs, TDMA
- The impact of UMTS is not included due to a limited rollout and small number of subscribers
- Study period is 5 years: 2000 to 2005

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Methodology (2)

- Investigated the following scenarios:
 - Drop in cost per minute (CPM) in the UK, GSM only
 - Drop in CPM in western Europe, GSM only
 - Drop of CPM in the countries with mid term technology competition (more than 4 years)
 - Drop of CPM in the countries with recent technology competition (less than 4 years)
 - Drop in CPM within one year of introducing new technology
 - For the year when competition was introduced

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Results

region/country	% drop in cost per minute
UK	10%
countries with single technology (GSM) (19)	17%
countries with long term technology competition (more than 5 yrs)	30%
countries with new technology competition (within last 5 years)	40%
within one year of introducing new technology	
China	13% (57% over 5 yrs)
India	42% (76% over 5yrs)
Russia	32% (73% over 5yrs)

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There are three distinct major advantages that CDMA2000 can bring to Operators.

- Enabling complete flexibility,
 - differentiation,
- low cost high capacity benefits.

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CDMA2000 Key Benefits (1/3)

■ Technology – Low Risk.

- CDMA2000 is a superior technology that provides:
 - Third Generation Compliant according to ITU IMT-2000 standards
 - Mature, stable and proven technology, commercialized in 2000
 - Compatible with GSM – services, applications and interoperability
 - High Capacity, Economical Technology
 - *Average Cost per MB 2¢
 - *Average Cost per Minute 0.01¢
 - High Speed Data - Peak Rate 2.4MB,
 - Aggregated throughput 400-800Kbit/s
 - Excellent Voice quality, better or comparable to landline
 - Global Positioning System capabilities, with 10-50 meter accuracy.
 - Smooth evolution to future CDMA2000 releases, investment protection.
 - Forward and Backward compatible, infrastructure and handsets/devices
 - Many choices of spectrum,
 - 450Mhz, 800Mhz, 1800Mhz, 1900Mhz and 2.1Ghz

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CDMA2000 Key Benefits cont (2/3).

■ Services and Applications.

- All GSM supplementary and telemetry services are supported including SMS, MMS, and roaming.
- CDMA & GSM interoperability and roaming for voice and data exist via Interworking Intraoperability Function (IIF).
- Due to CDMA low cost structure; Existing Operator static Services and Applications can evolve into Dynamic rich content multi-media applications.
 - Existing MMS and java applications work with CDMA2000
 - Also allowing new and innovative services applications to be deployed today to further enhance Operator differentiation.
- Operator can use CDMA2000 capacity and speed advantage for offensive or defensive strategies, example;
 - Enables Operator to compete much more aggressively on price.
 - Offer more for the same, or more for less.
 - Introduce a wholesale, MVNO type business models.

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CDMA2000 Key Benefits cont. (3/3)

- Handset and Devices
 - More than 650 devices are available on the market with colour displays, cameras and GPS capabilities.
 - CDMA2000 handsets and devices are mature, proven and stable.
 - CDMA2000 handsets are completely programmable by Operator.
 - Providing complete control to Operator on User Interface and Over The Air activation and downloading.
 - Single Mode, Quad/Tri/Dual band handset for roaming between CDMA spectrum available
 - Dual Mode, Dual Band handset for GSM/CDMA roaming available
 - Low cost, comparable to GSM with similar feature.
 - Much cheaper than EDGE and UMTS with lot more choices available today.
 - Small form factor, long battery life and attractive looking – come in many styles and models addressing all market segments.
 - PCMCIA type for laptops
 - Fixed Wireless terminals
 - Embedded industrial devices

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