Third-generation Cellular: Technical and Economic Challenges

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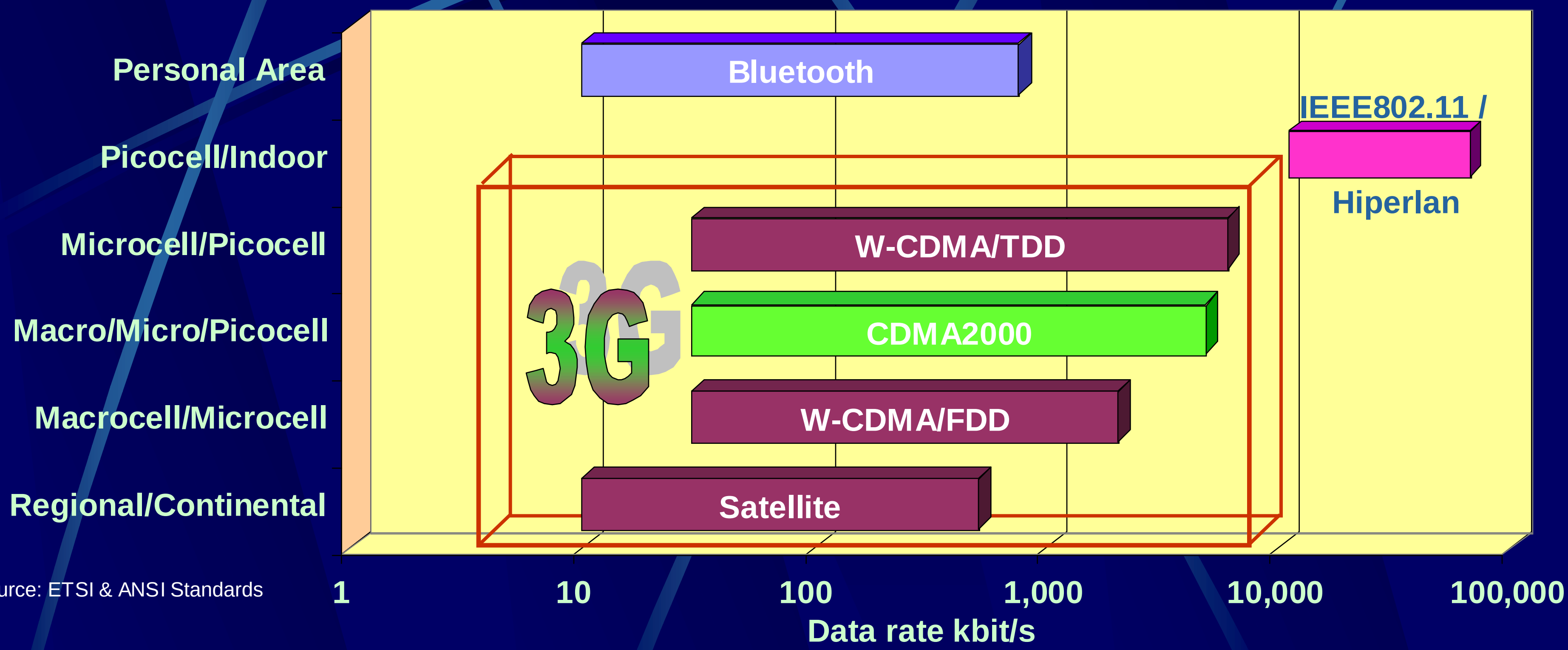
Agenda

- Third Generation Cellular
- Technical Challenges: Range, Coverage, Capacity, & Spectrum
- Economic Challenges: Market Share & 3G Spectrum Auctions
- A Modest Proposal

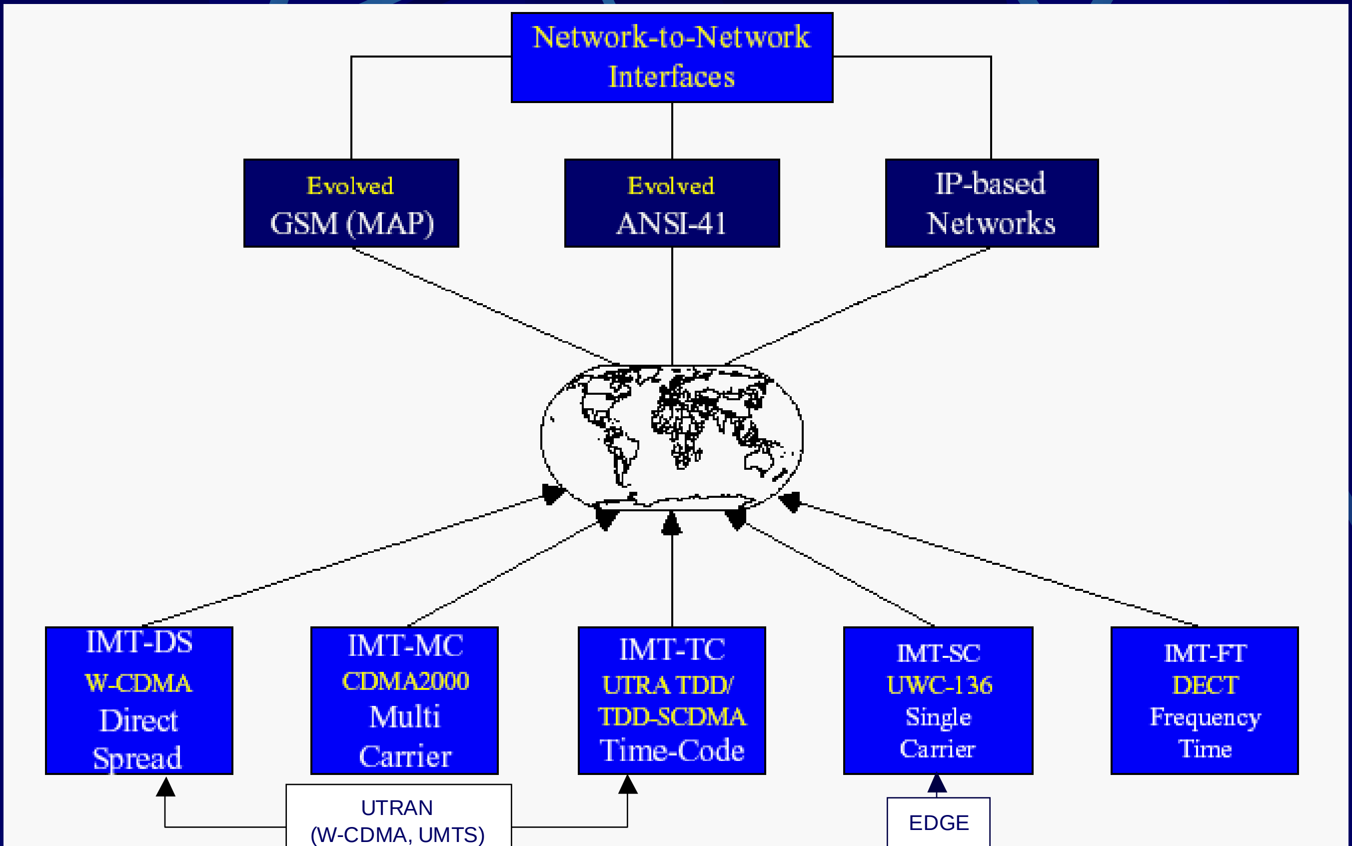
3G in the "Big Picture"



Source: ETSI & ANSI Standards

ETSI has created a hierarchy of personal communications modalities that provide the maximum data rate possible given where the customer is at a given time. In the US this is complemented by CDMA2000.

IMTS – 2000: 5 Standards



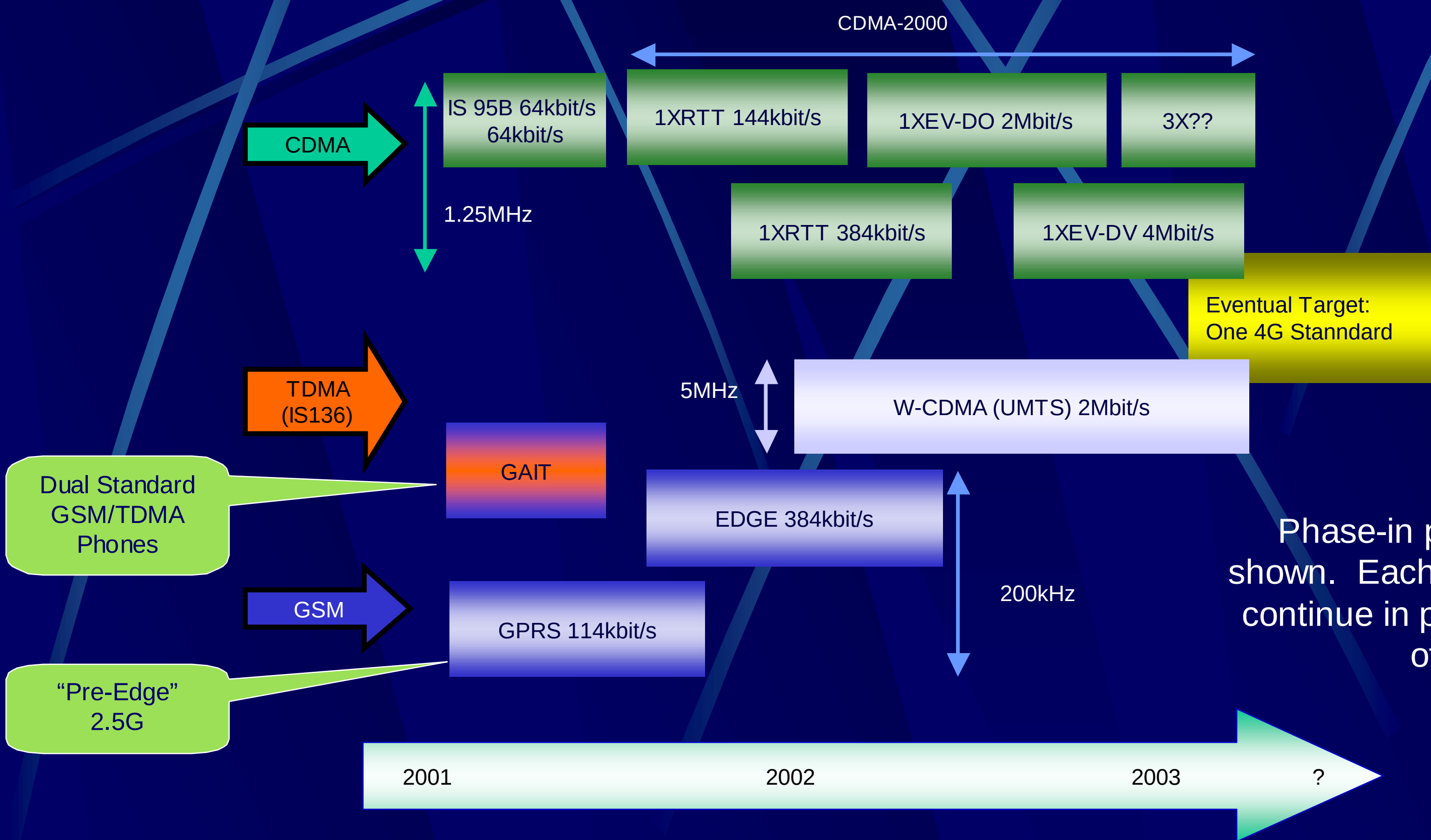
Source: RCR Magazine 4/2000, Cahners In-Stat Group

These are the terrestrial standards only. There will be satellite standards also. The GSM "camp" sponsors UTRAN; the CDMA camp sponsors IMT-MC (CDMA2000). The US TDMA camp sponsors EDGE (IMT-SC) and will migrate to W-CDMA.

What's Special About 3G?

It's not just phones. It's PDAs, videophones, Internet browsing, location-based services, interactive games, and a whole lot more.

Evolution of 3G Systems



Phase-in periods only are shown. Each technology will continue in parallel with the others for a time.

Source: ITU

Timeline may be delayed due to economic technical and standards issues

3G Status

- CDMA2000 is operating in Korea with about a million customers. World availability expected mid – late 2002.
- W-CDMA is operating in Tokyo using Ericsson equipment. World availability expected late 2002 – first half 2003
- Cingular is rolling out GPRS (precursor to EDGE) nationwide in the US – a $3B exercise

Range / Coverage

CDMA2000 operators will need to build more, smaller coverage cells to make this work

Source: JMS Worldwide
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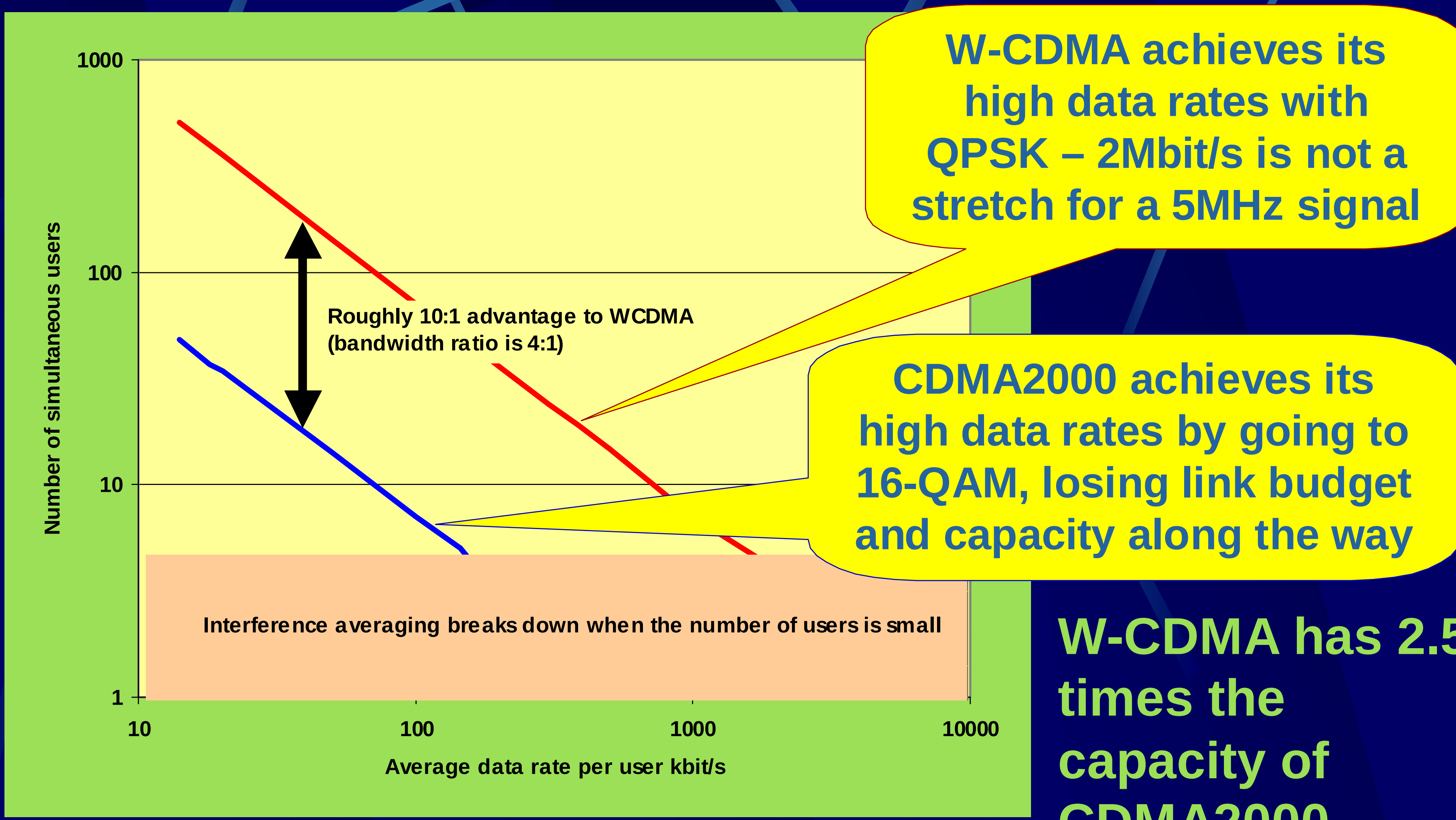
		Max free space path loss dB			R[illegible]ell Size [illegible]om Base	
	Standard	In-Building	Outdoor low mob	In-Vehicle	Radi[illegible]	Area
CDMA one- CDMA2000	1XEV-DO	127.56	140.40	142.83	81%	65%
	1xRTT	127.76	n/a	142.32	77%	59%
	Base Case: IS-95	130.81	n/a	146.31	Base case	
GSM - W-CDMA	W-CDMA	129.06	150.36	146.02	99%	98%
	EDGE-2 (384kbit/s)	124.80	148.50	n/a	75%	56%
	EDGE-1 (144kbit/s)	n/a	n/a	143.30	87%	76%
	Base Case: GSM	129.20	n/a	145.40	[illegible]e case	

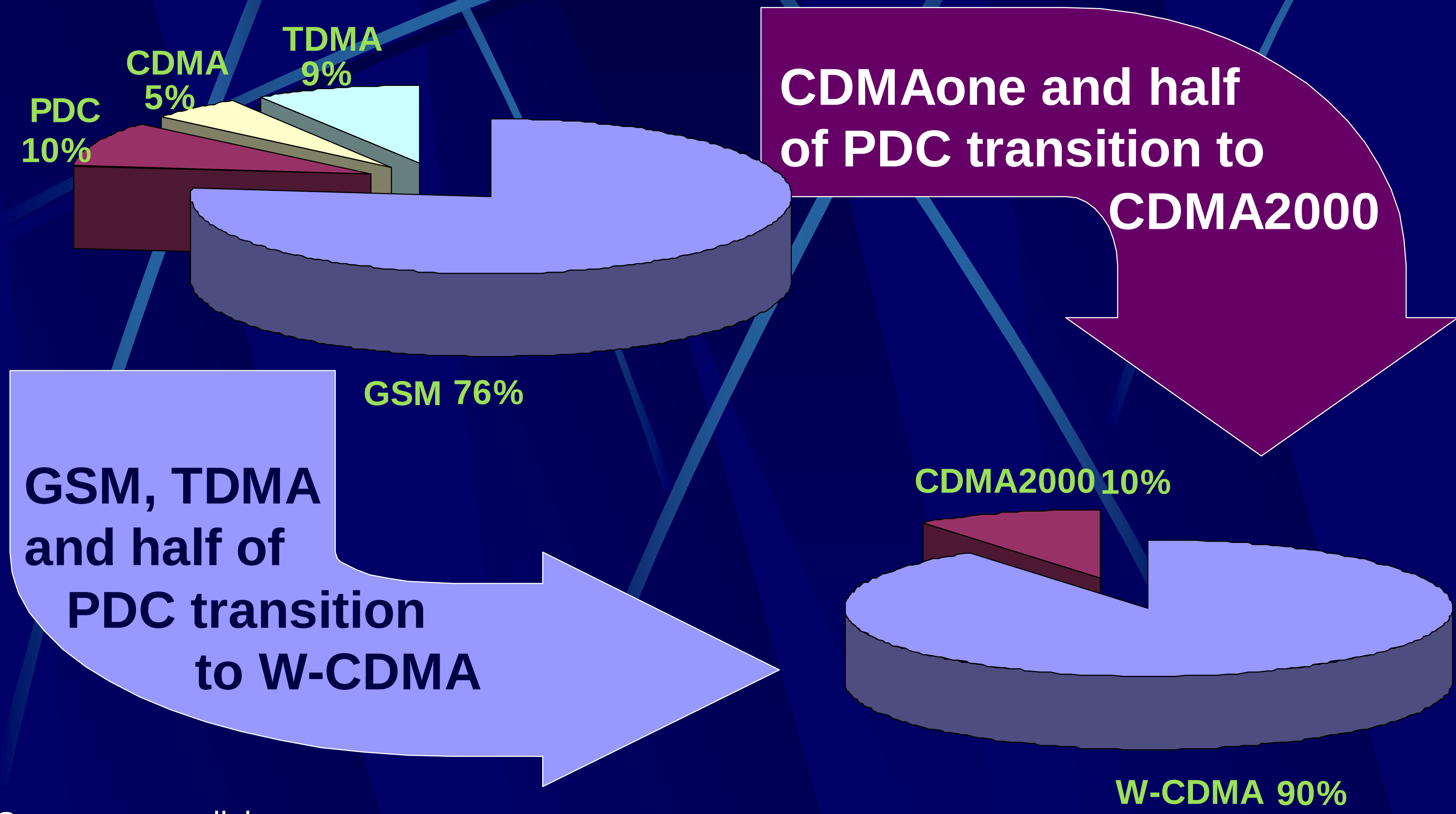
GSM operators are expected to build more base stations for EDGE – that they won't need for W-CDMA!

Capacity



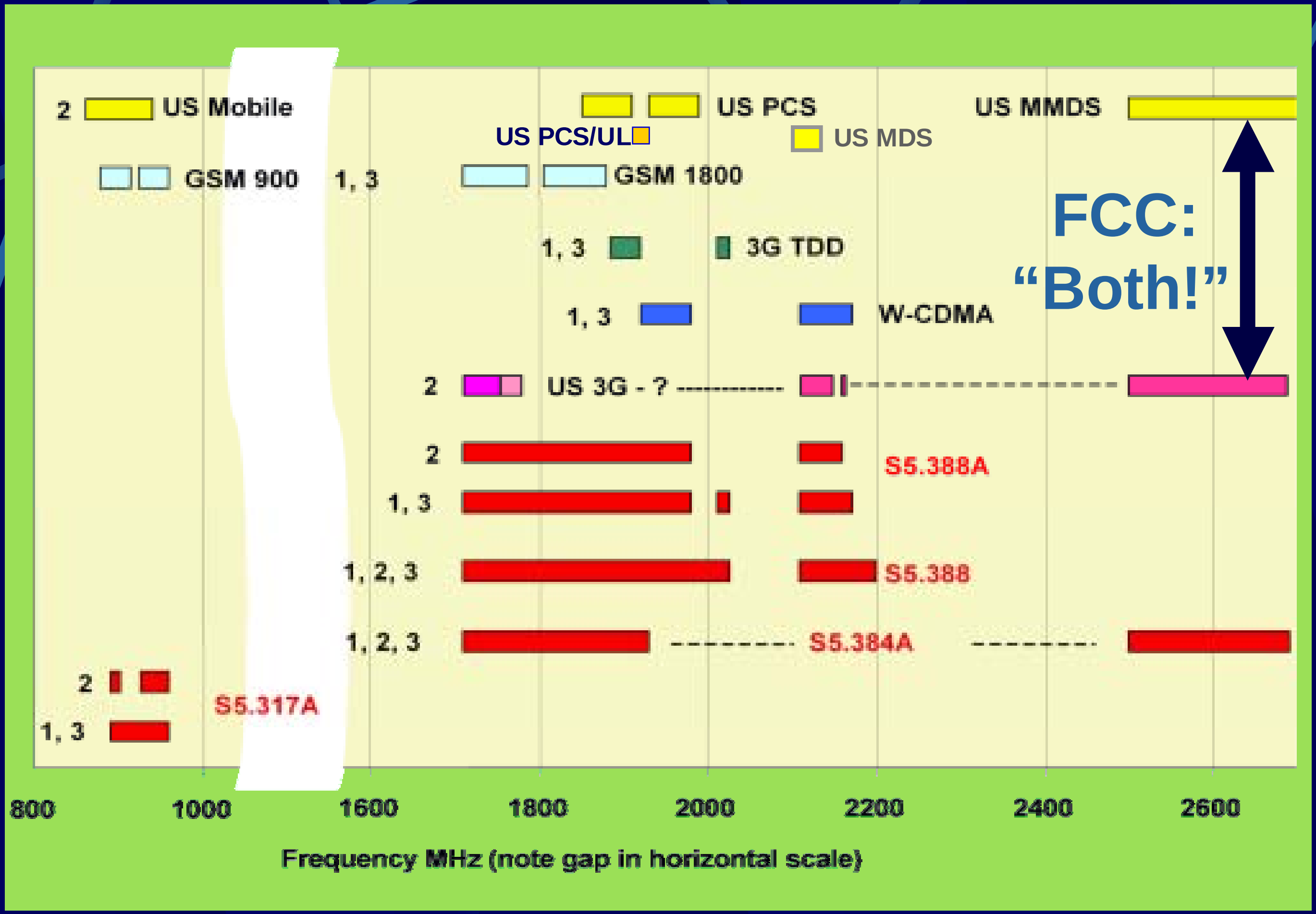
W-CDMA has 2.5 times the capacity of CDMA2000

Market Share



Source: www.cellular.co.za

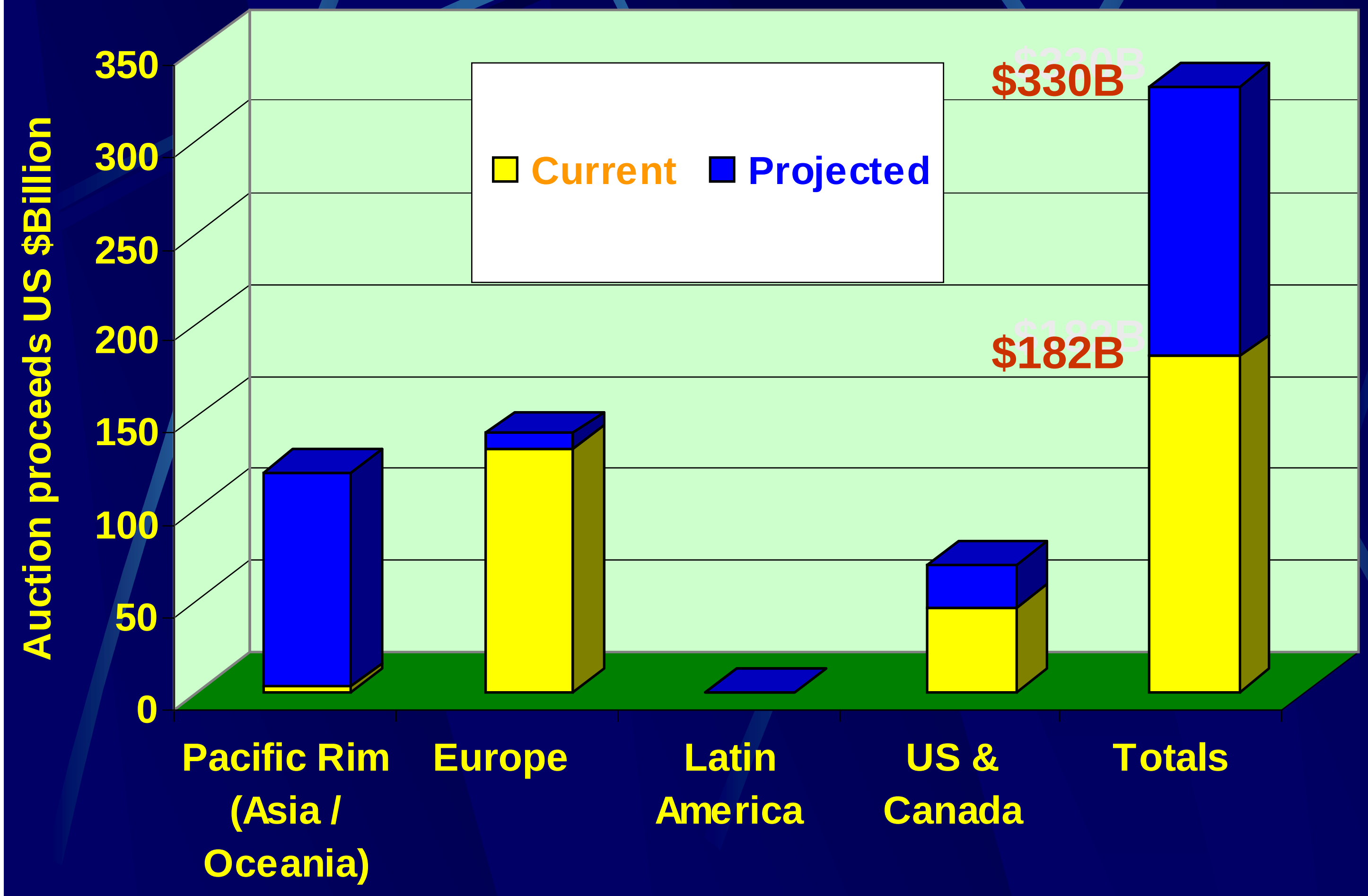
Spectrum Confusion



Sources:
ITU,
ERO,
FCC

Once again the US is isolated by the FCC's prior actions

Spectrum Auctions Worldwide



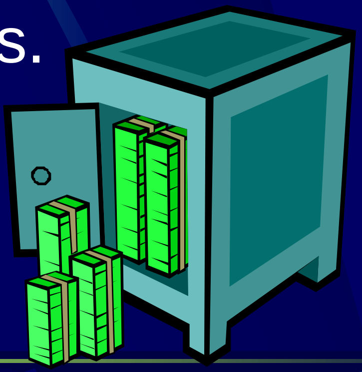
Hundreds of spectrum auctions have already been run. The proceeds so far - $182B - are shown as "current". The "projected" numbers are based on demographics and announcements of future auctions.

The Big Spenders

3G	Auction Proceeds $B	Proceeds per pop $
UK	$ 38.50	$ 594.20
Germany	$ 50.80	$ 566.90
Italy	$ 10.18	$ 174.20
S. Korea	$ 3.30	$ 60.80
Holland	$ 2.68	$ 158.90

These “Top Five” 3G auctions, held in the last 18 months, account for more than 58% of the total $182B proceeds collected from auctions worldwide over the past 15 years.

Altogether 3G auctions alone have accounted for $142B of the total, or 78%



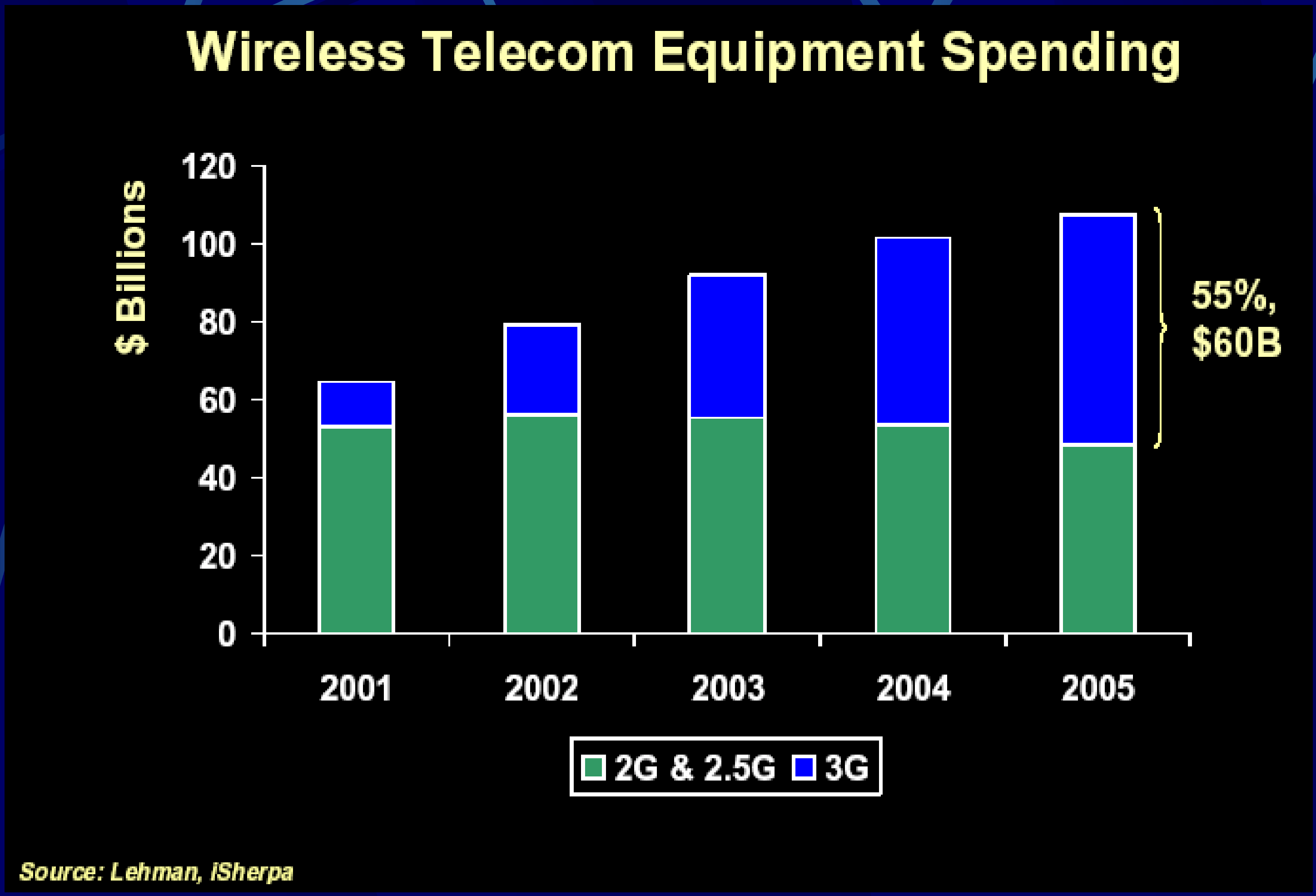
How Much is $330B?

- It is the Gross Domestic Product of Switzerland.
- It is the combined annual revenue of Exxon-Mobil and General Electric
- It is $1,172 for every man, woman and child living in the United States

"If you can count your money, you don't have a billion dollars"

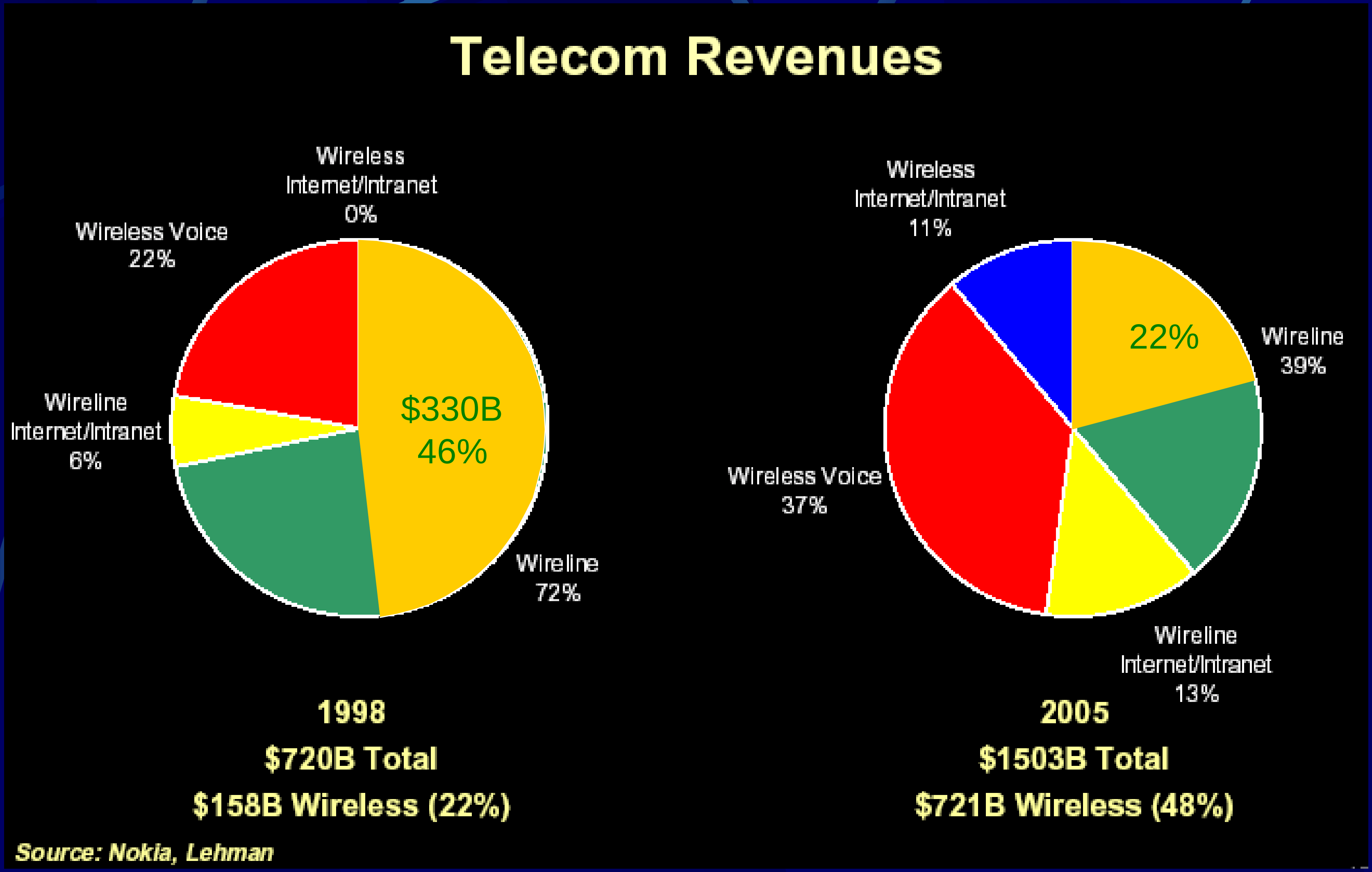
… J Paul Getty

Air vs. Hardware

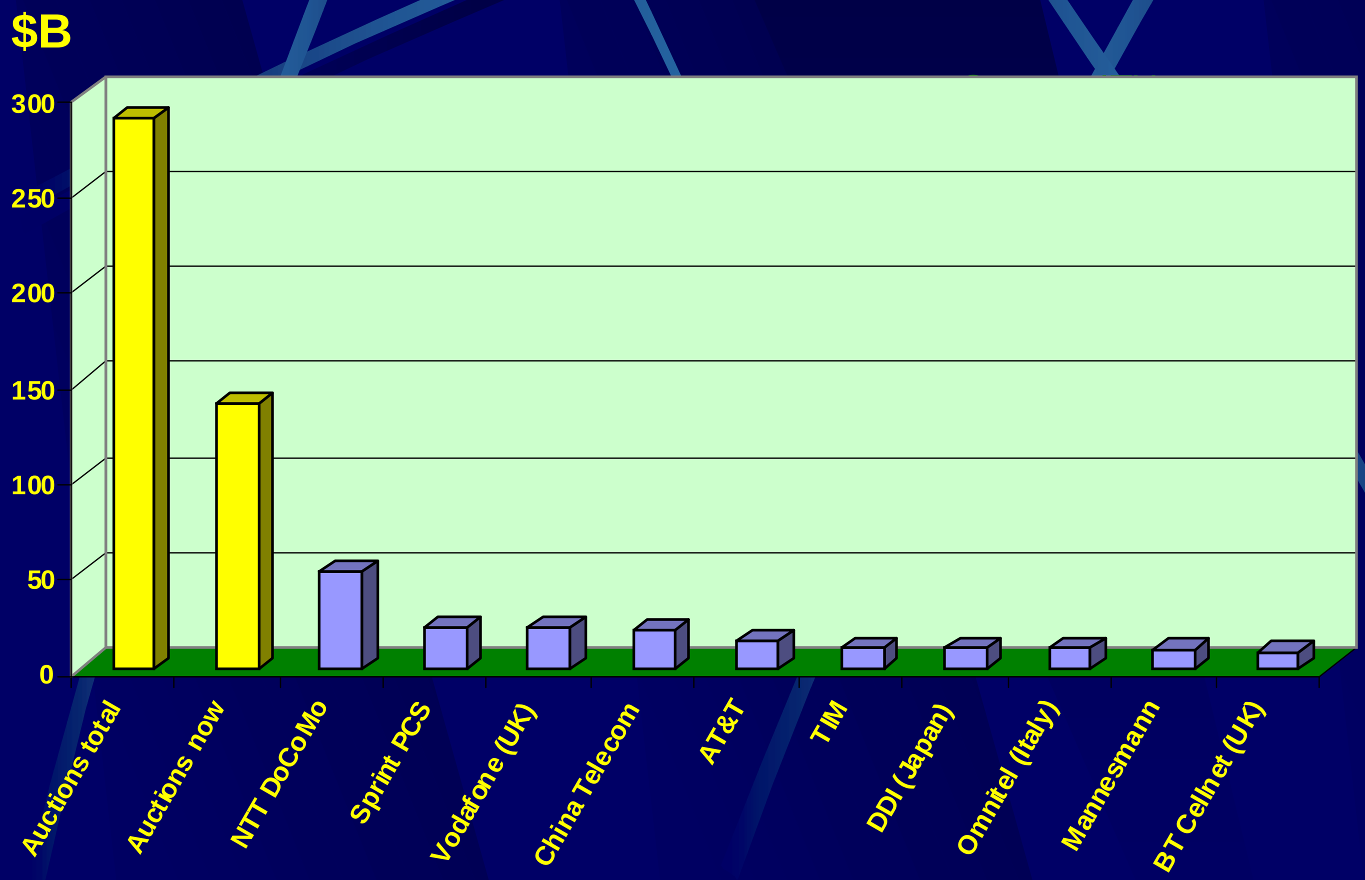


$330B to the same scale

Air vs. Revenues



Air vs. Cellular 10



The Auctions are already level with the top 10 cellcos combined. If the projections are correct, it would be much larger than the top 20!

Mark Anderson's "Modest Proposal"

- The debt burden of 3G operators is as oppressive as that of some third world countries
- The wireless industry cannot recover this outlay, which was due to "extortion bidding"
- Governments should return the 3G money as an interest-free loan
- The EU has started hearings on the question
- The FCC has been forced to give up part of its anticipated revenue (NextWave case)

Source: http://www.tapsns.com/newsitem.shtml?7-25-2001

Conclusions

- 3G is late but provides a rich array of services that will likely stimulate the market
- CDMA2000 will have the toughest time – small market share, licensees often not receiving new spectrum
- W-CDMA won't be easy either – huge spectrum auction costs, later entry than CDMA2000

Thank You!