

When will data overtake voice?

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When will data overtake voice?

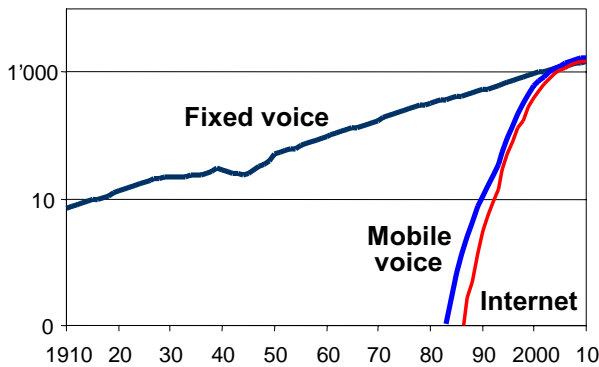
- **Why is the question important?**
 - ⇒ **Investment in networks**
 - ⇒ **Investment in companies**
- **Different dimensions of the question**
 - ⇒ **Data overtaking voice, by volume**
 - ⇒ **Data overtaking voice, by value**
 - ⇒ **Cross-over points at international and national levels**
- **Implications**
 - ⇒ **... for network provisioning**
 - ⇒ **... for bandwidth pricing**



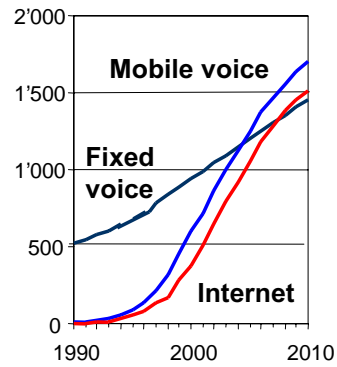
Taking the long-term view

Fixed voice, Mobile voice and Internet users worldwide (millions)

1910-2010, Logarithmic scale



Normal scale



Source: ITU.

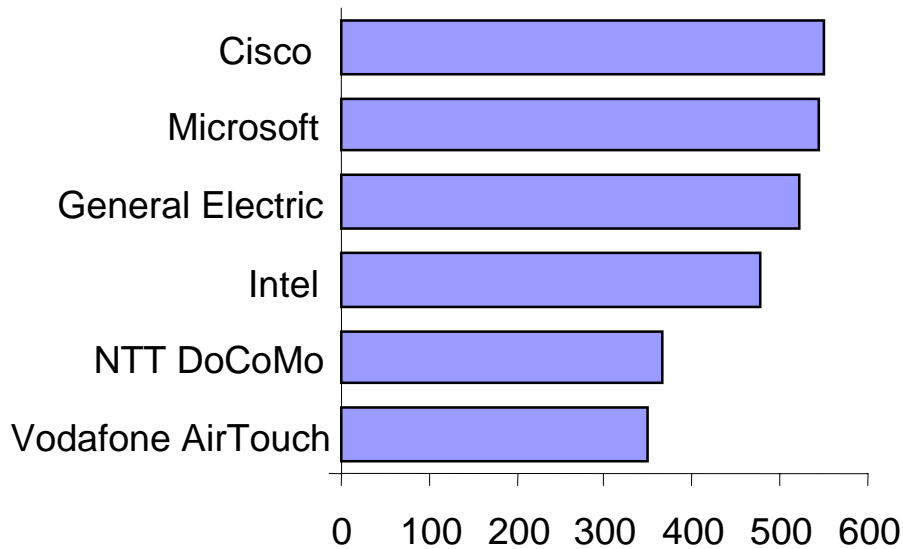


Relative bandwidth requirements (highly approximate!)

Typical usage	Duration and volume	Bandwidth per month	Relative size
Voice telephone user	6 hours per month: 8 kbit/s duplex	350 Mb	◦
Current Internet user	30 hours per month: 56 kbit/s downstream, 4 kbit/s upstream	6.5 Gb	●
Future Internet user (streaming media)	50 hours per month: 1 Mbit/s downstream, 56 kbit/s upstream	190 Gb	●



Market capitalization driven by market expectations: Top 6 firms in US\$bn



Source: Primark Datastream, valid at 27 March 2000.



When will data overtake voice (1): By volume?

● Measured by traffic:

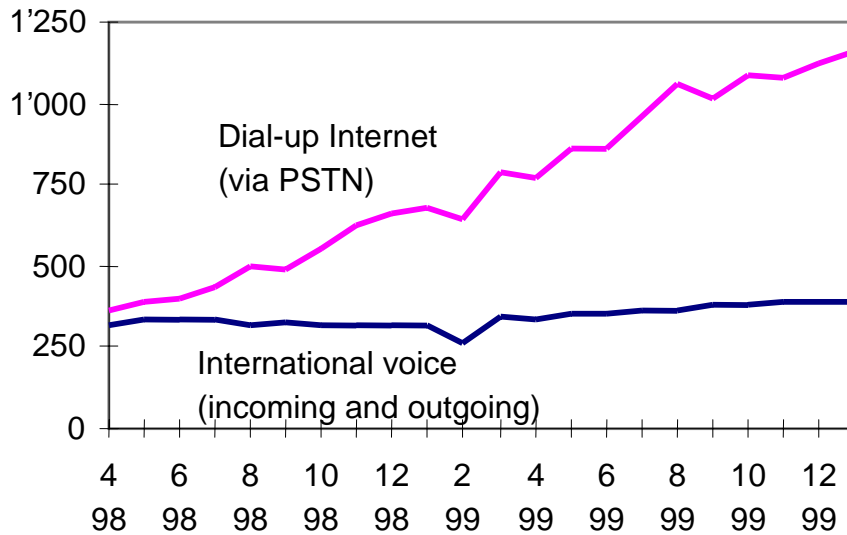
- ⇒ Around 94 billion minutes of international PSTN traffic in 1998 (mainly voice and fax)
- ⇒ Around 5 trillion minutes of total PSTN traffic
- ⇒ Global quantity of data traffic not known, but growing exponentially (doubling every 100 days?)
- ⇒ Comparable data available for individual countries (e.g. Hongkong SAR, Germany, Portugal, Sweden)

● Measured by circuits:

- ⇒ Data available for US carriers, broken down by PSTN, IPL and other
- ⇒ Crossover between PSTN and IPL in 1998



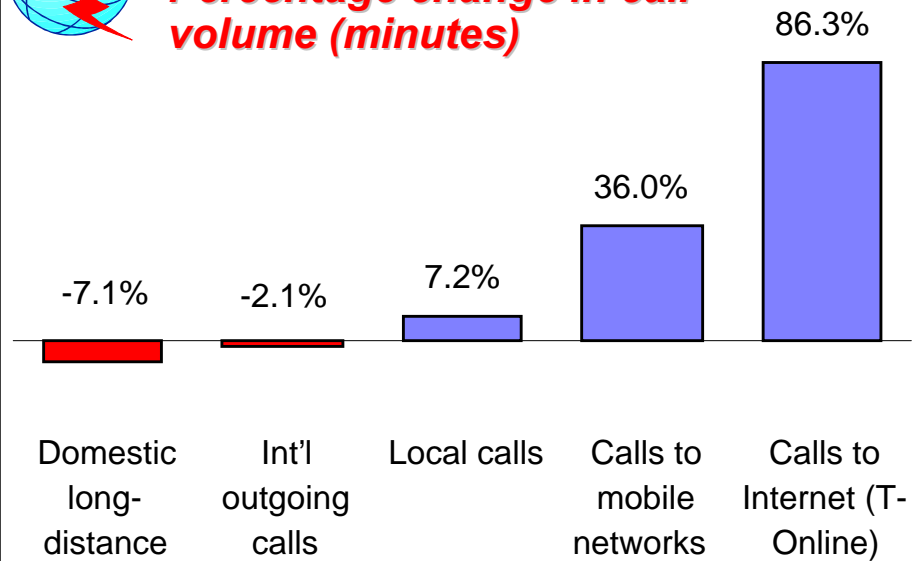
Minutes of use by month, Hongkong SAR ('000s)



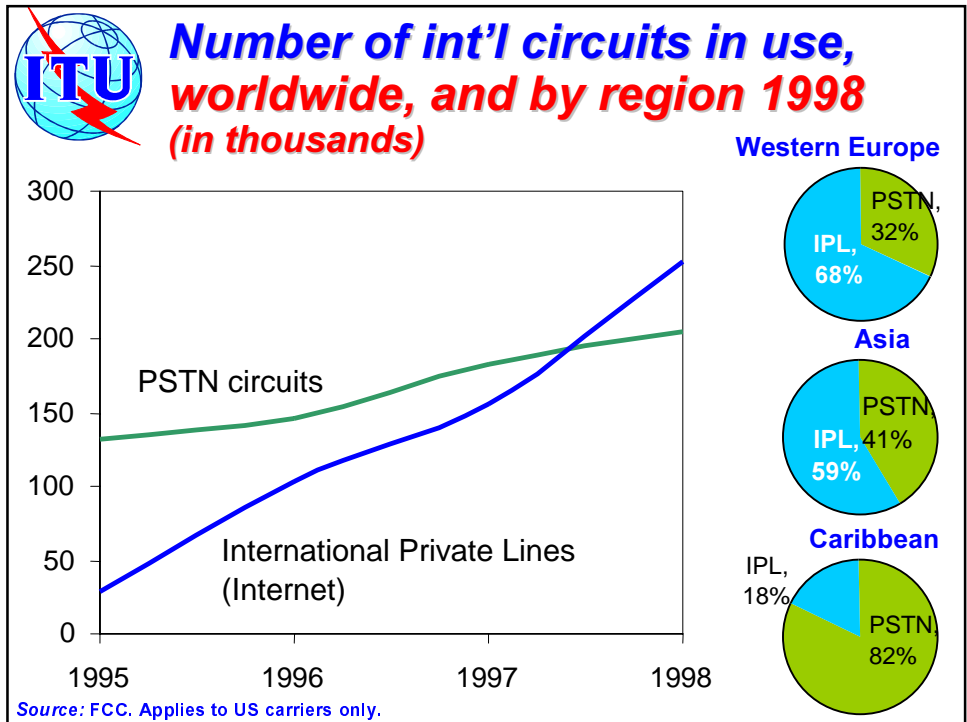
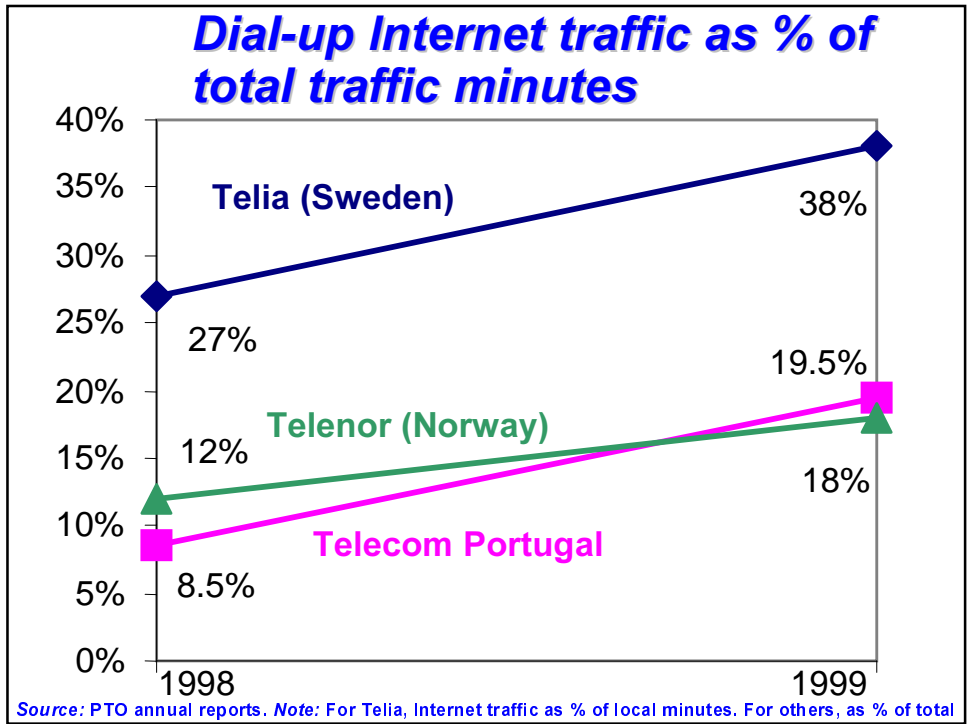
Source: OFTA (www.ofta.gov.hk)



Deutsche Telekom Percentage change in call volume (minutes)



Source: Deutsche Telekom annual report.





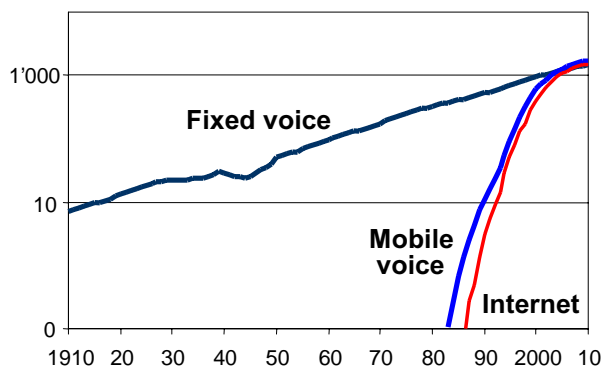
When will data overtake voice (2): By value?

- **Paradigm shift postponed**
 - ⇒ Most Public Telecommunication Operators still heavily dependent on voice revenues
 - ⇒ Mobile revenues (largely voice) represent main current area of growth
 - ⇒ Price erosion of Internet revenues is offsetting volume gains (e.g., falling leased line prices)
- **Paradigm shift regained**
 - ⇒ Mobile Internet is likely to be a major area of future revenue growth
 - ⇒ Possible future shift of broadcast entertainment (TV, music, pay-per-view) onto telecom-type networks (broadband Internet)

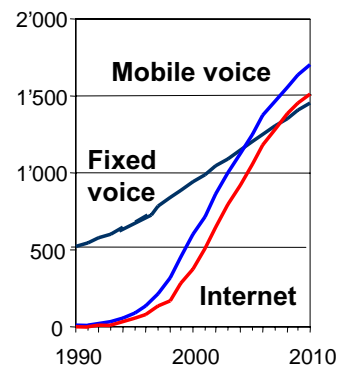


Taking the long-term view Fixed voice, Mobile voice and Internet users worldwide (millions)

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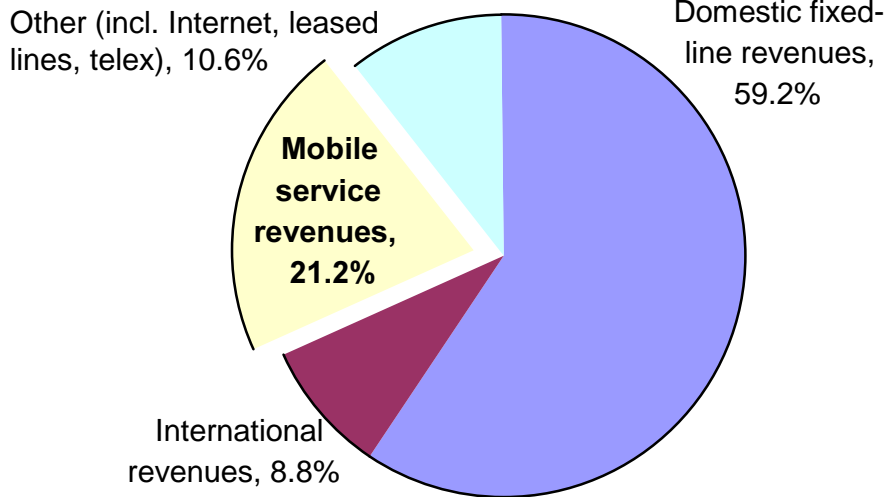
Normal scale



Source: ITU.



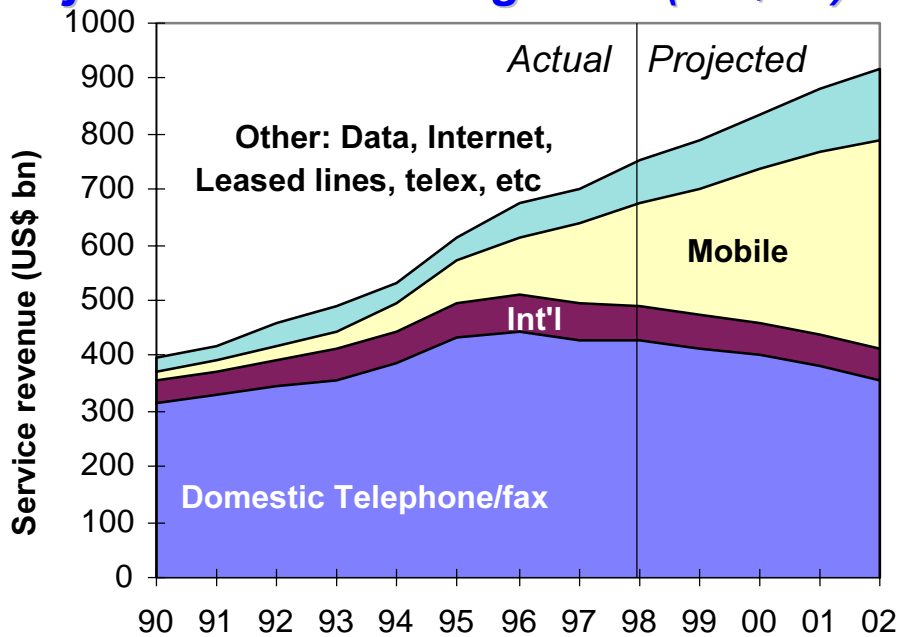
The changing pie: Global telecom service revenue, 1998



1998 Telecom service revenue. Total = US\$724b

Source: ITU "World Telecommunication Development Report 1999: Mobile cellular"

Projection of revenue growth (US\$bn)



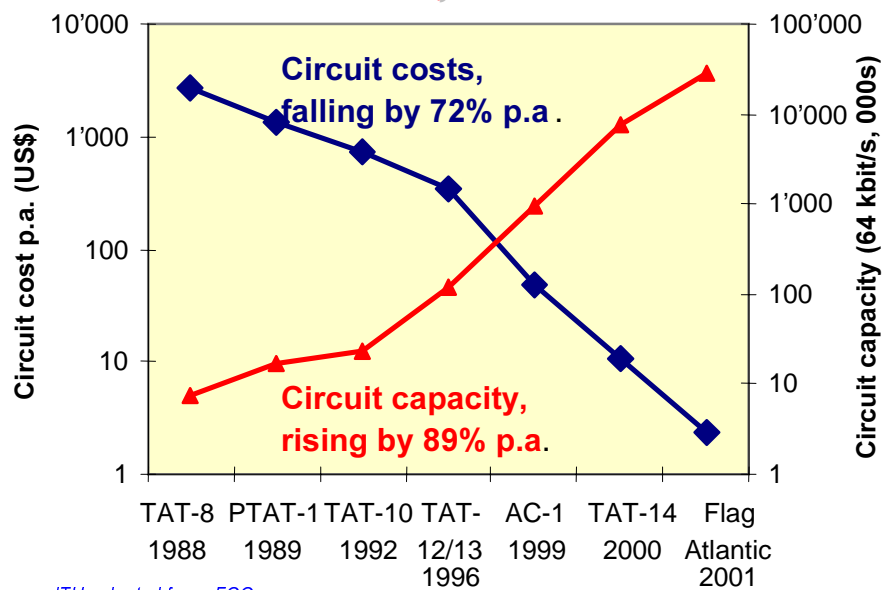
Source: ITU "World Telecommunication Development Report 1999: Mobile cellular"



Implications for network provisioning

- Internet is likely to be the main demand driver
 - ⇒ World Wide Web
 - ⇒ Company Intranets
 - ⇒ Managed IP-based networks
 - ⇒ Streaming media
- Voice growth may nevertheless be significant
 - ⇒ International voice growing by around 15% p.a.
 - ⇒ Demand for digitized voice in unified messaging applications
 - ⇒ Voice demand will be more geographically dispersed than data demand

Infrastructure capacity and costs, TransAtlantic cables, 1988-2001

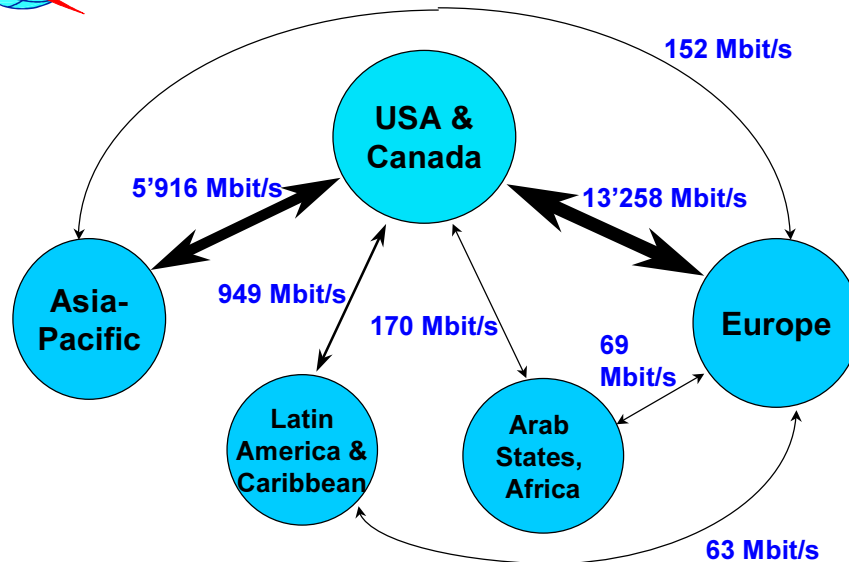


Source: ITU, adapted from FCC.

Note: Circuit costs assume a usage level of 18%, a compression level of 5:1 and a life-time of 20 years.



Inter-regional Internet backbone



Implications for bandwidth pricing

- “Cost-oriented” pricing may be unsustainable
 - ⇒ Customer perception is that voice has more “value” than data
 - ⇒ Narrow-bandwidth services, such as voice, might otherwise be “too cheap to meter”
- Pricing for access more significant than pricing for usage
 - ⇒ Price of link to fat pipe would cost more than share of fat pipe
 - ⇒ Internet-style flat-rate, distance-insensitive tariffing of capacity likely to be dominant mode
- Key to success will be managing transition to lower prices