

Mobile Packet Data Pricing, Quality of Service and Profit Maximisation

IBC Mobile Pricing Master Class - June 2002

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Agenda

- Introduction
- Principles of packet data pricing
- Relationship between traffic, quality of service and capital expenditure, balancing revenues and costs
- 3G operators as landlords in the digital economy
 - Location of content to maximise perceived quality of service
 - Third party conveyance revenue
- Pricing in the context of the application and willingness to pay
- Fixed vs. variable charges



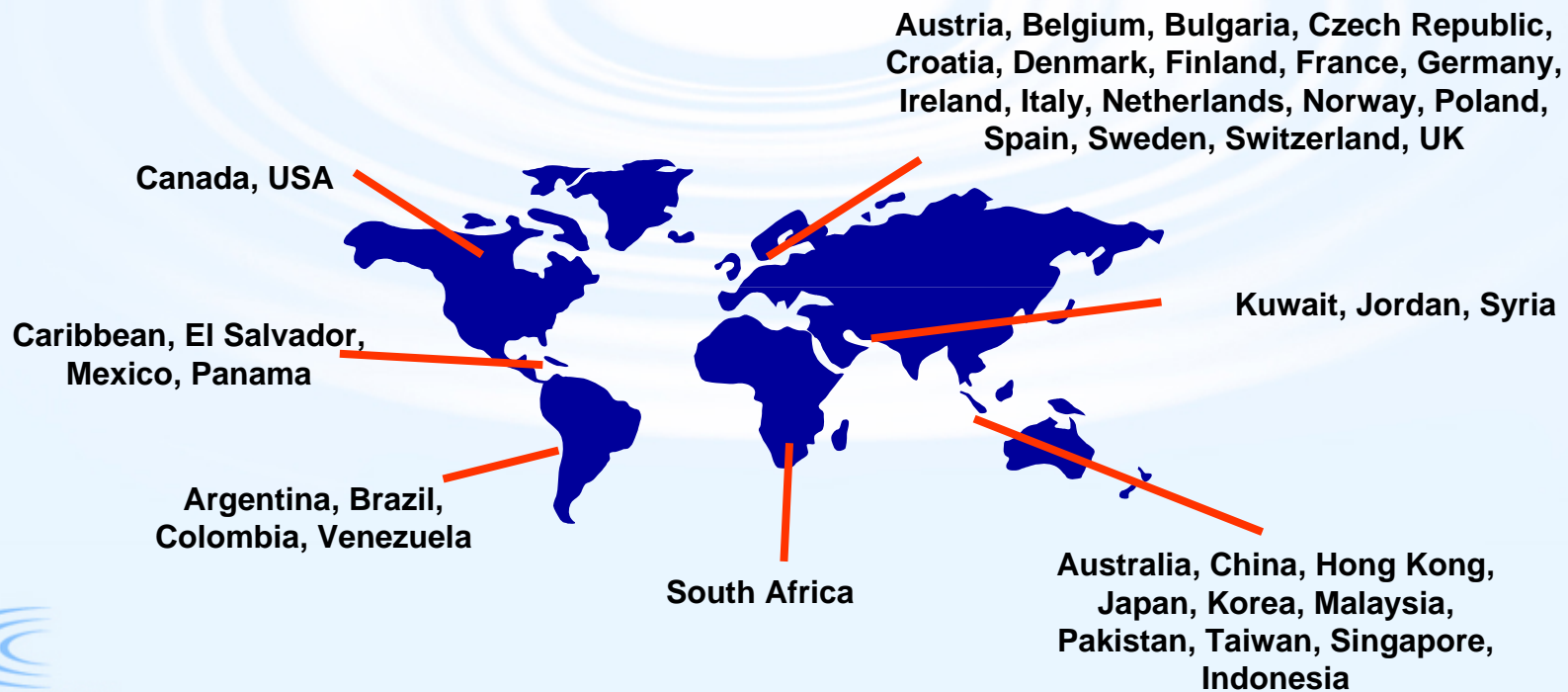
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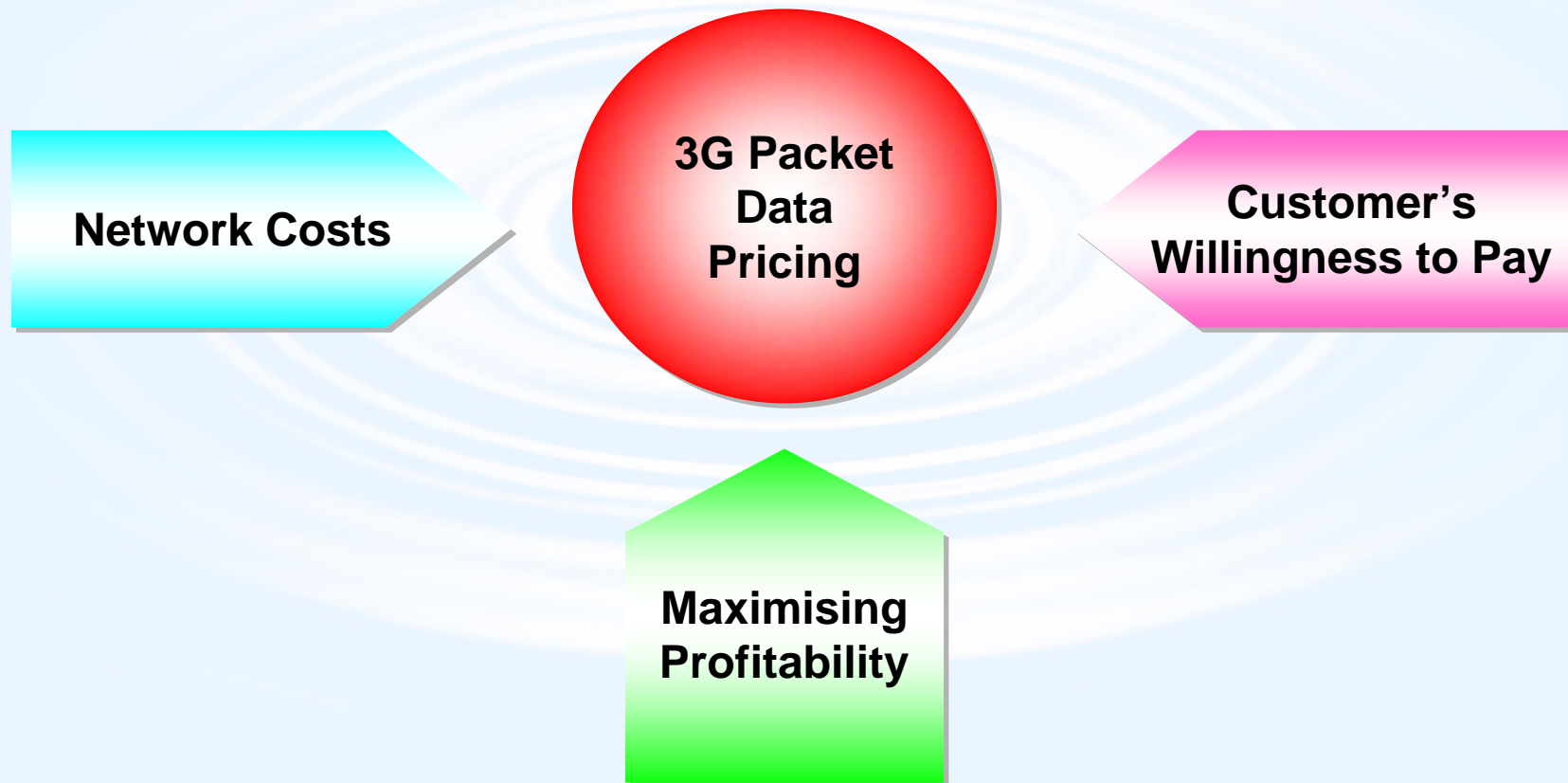


Coleago Consulting Ltd is a consulting firm specialising in the telecoms, media and technology sectors.

- Coleago's consultants have worked on 2G / 3G mobile projects in over 40 countries, advising clients mobile business development including demand assessment, tariffing, positioning, interconnect, coverage roll out, business planning, market forecasting, network audit and optimisation etc.



The main factors which determine 3G packet data pricing are the cost of providing service, how much users are willing to spend in the context of an application and the objective of maximising profits.



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There are several types of packet data traffic. The essential difference is whether data is delay tolerant or not.

- Some data, for example video telephony, is not tolerant to delays. If data is held up the picture gets blurred. The data requires a certain bandwidth all the time i.e. a specified constant bit rate. Although data is packet switched, it requires network resources similar to circuit switching.
- Most packet data traffic is delay tolerant e.g. Internet applications such as web-browsing and messaging. It does not matter whether transmission of an e-mail takes a few seconds more. Most packet data traffic is delay tolerant,
- Packet data networks are very efficient if the network resource is shared between several users to transport data that is delay tolerant.
- The vast majority of 3G traffic will be delay tolerant (UDD). This is the focus of this presentation.



Speed of access is one of the main attractions of an always-on Internet access service.

- Learning from fixed broadband services:
 - Recent research for broadband services showed that 79% of adopters cited increased access speed as the primary reason for adoption. Content was relatively unimportant.

No other Internet service can do this.

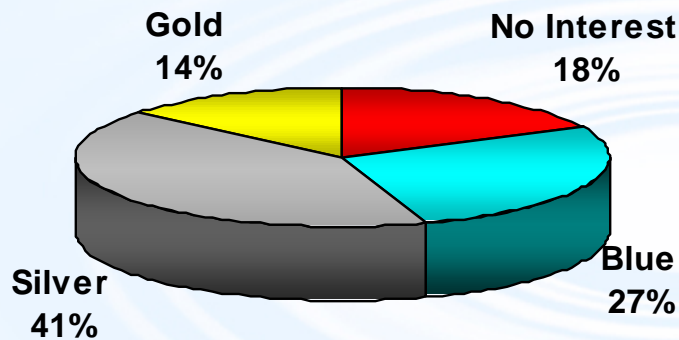
Jumbo Web Pages Per Minute:*



*Number of 3,384 Kb pages downloaded in one minute.

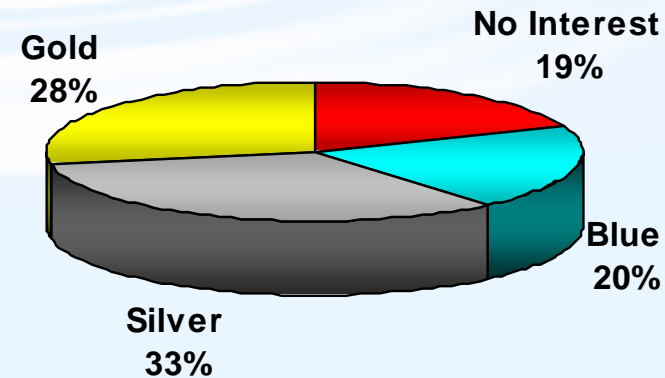
Conjoint analysis carried out in Belgium showed that potential UMTS users are prepared to pay more for higher speeds.

Consumers



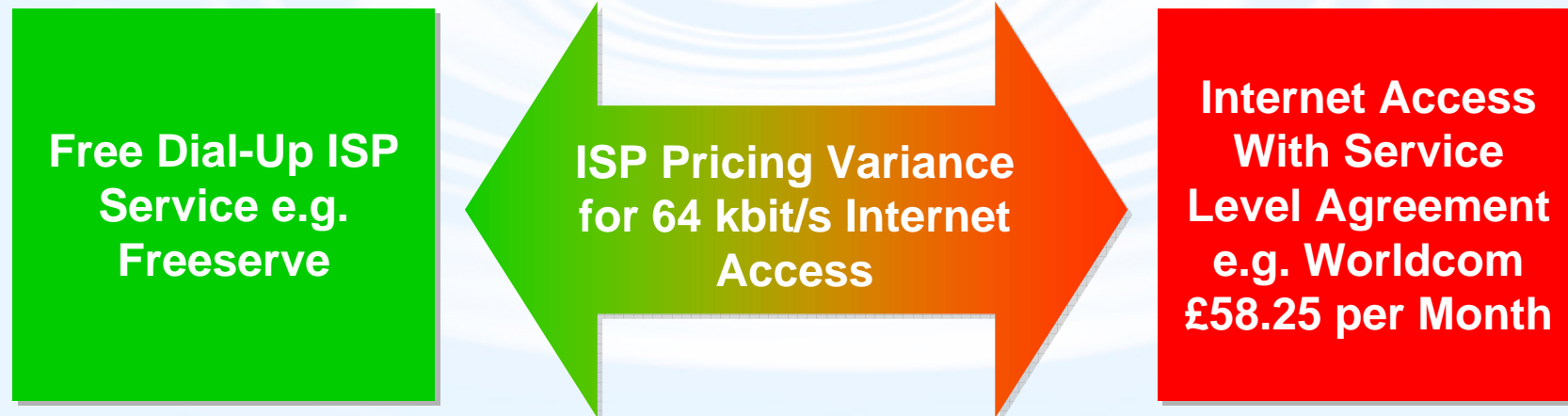
Blue: 64 kbit/s for 25 Euro/ month
Silver: 128 kbit/s for 50 Euro / month
Gold: 256 kbit/s for 100 Euro / month

Businesses



Quality of service is the key issue in Internet access pricing.

- It is simply not true that bandwidth is a commodity. Mobile access bandwidth and Internet connectivity is a scarce resource with huge variations depending on quality of service and location.



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The total traffic generated by each user has a major impact on the quality of service experienced by users.

- With GPRS and 3G all users in a cell share the same radio resources. This means the user experience depends on the number of users in a cell and the traffic generated by users.
- The bandwidth that can be achieved under ideal conditions in terms of kbit/s. This is also referred to as access bandwidth or burst rate and is likely to be an element in tariff design.
- The access bandwidth does not guarantee that the bit rate is available all the time. Aiming at an average bit rate achieved by users is a key network dimensioning parameter and hence cost driver.
- High traffic demand results in higher capex if quality of service is to be maintained. This can be reflected in tariffs by setting a monthly allowance for the amount of data users can transfer and charging extra for data volumes in excess of the allowance.



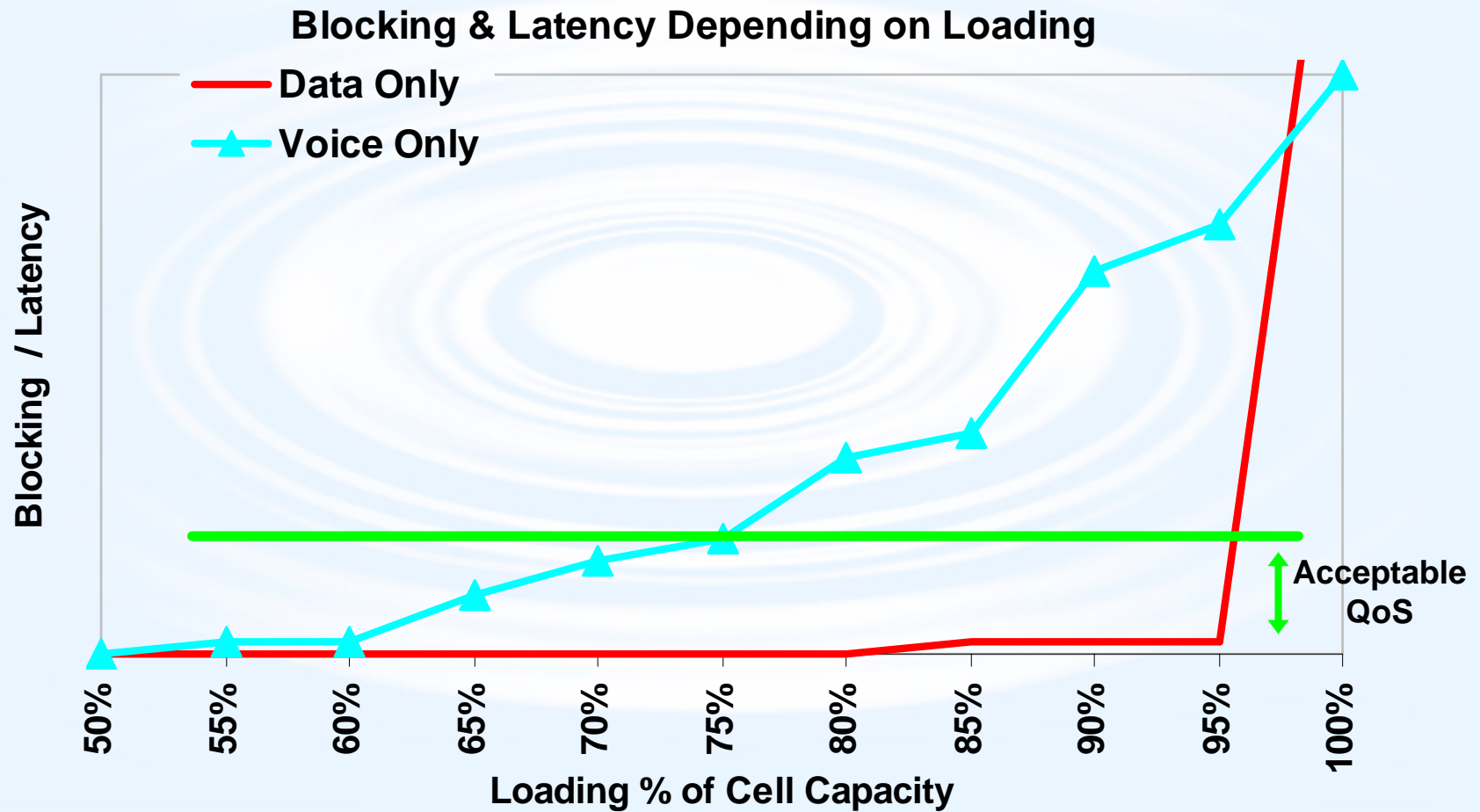
For always-on Internet services quality of service is likely to become a problem if operators do not charge for traffic volumes.

- U.S. Cable operators are facing serious problems with network bottlenecks and slowdowns as too many heavy Internet users go online at the same time. The problem of overcrowding is affecting cable operators as they aggressively upgrade their networks and sign up users for broadband services, such as Internet access, cable TV and telephone services. Problems are being generated by bandwidth-hungry users sending out large amounts of data over the Internet, perhaps by operating a home web site or streaming out video. This is despite customer agreements usually prohibiting this sort of excessive use.

Source: RDSL, 17 March 2000



The delay tolerance and burstiness of packet data traffic makes transport more efficient.



Results generated by Coleago Shared Access Simulation Tool

Although the unit incremental costs of voice and data are similar, this does not mean that unit prices should be similar.

- A large proportion of mobile network costs are fixed, rather than variable.
 - Economic theory suggests that these costs should be recovered demand side based on willingness to pay ('Ramsay Pricing').
 - Willingness to pay has be considered in the context of the application (this will be considered later in this presentation).
- However incremental unit costs do set a cost floor.
 - Pricing below incremental cost sends the wrong pricing signals to users, resulting in high usage and consequently higher capex if quality of service is to be maintained.



Comparison of GSM and UMTS configurations

- GSM
 - 3 sector site, allows typically 4 to 5 TRX (radio carriers) per sector
 - 7 slots per carrier may be used for data or voice traffic
 - GPRS modulation 9 to 21 kbit/s per slot
 - throughput per site = 900 kbit/s to 2.2 Mbit/s
- UMTS
 - 3 sector site, maximum 3 UMTS carriers per sector
 - assumed downlink rate per user 144kbit/s
 - typical maximum downlink per carrier 730 kbit/s (macro-cell)
 - throughput per site = 6.5 Mbit/s downlink
- UMTS delivers 3 to 7 times throughput of GSM
 - depending on particular assumptions made
 - typically factor increases to 6 to 14 times GSM cell capacity in the case of a UMTS micro-cell



Supported subscribers per UMTS site is similar to 2G voice

- Assumed offered user data rates over UMTS
 - maximum rate per user = 144 kbit/s
 - minimum rate per user (contention ratio 75) = 1.92 kbit/s
 - contention ratios for consumer single user ADSL services are around 50
- Hence, data users per site = 3,385
 - given by $6.5 \text{ Mbit/s} \div 1.92 \text{ kbit/s}$
- Comparable voice users per site using GSM = 3,400
 - assumes 25 mErl voice per subscriber, 2% grade of service
- Conclusions
 - With a contention ratio of 75, all voice users may also be data users, in rural (coverage limited) areas data users may be higher proportion of total subscriber base
 - Very roughly this suggests that revenues from 3G data transport must be 50-60% of the revenue generated from voice

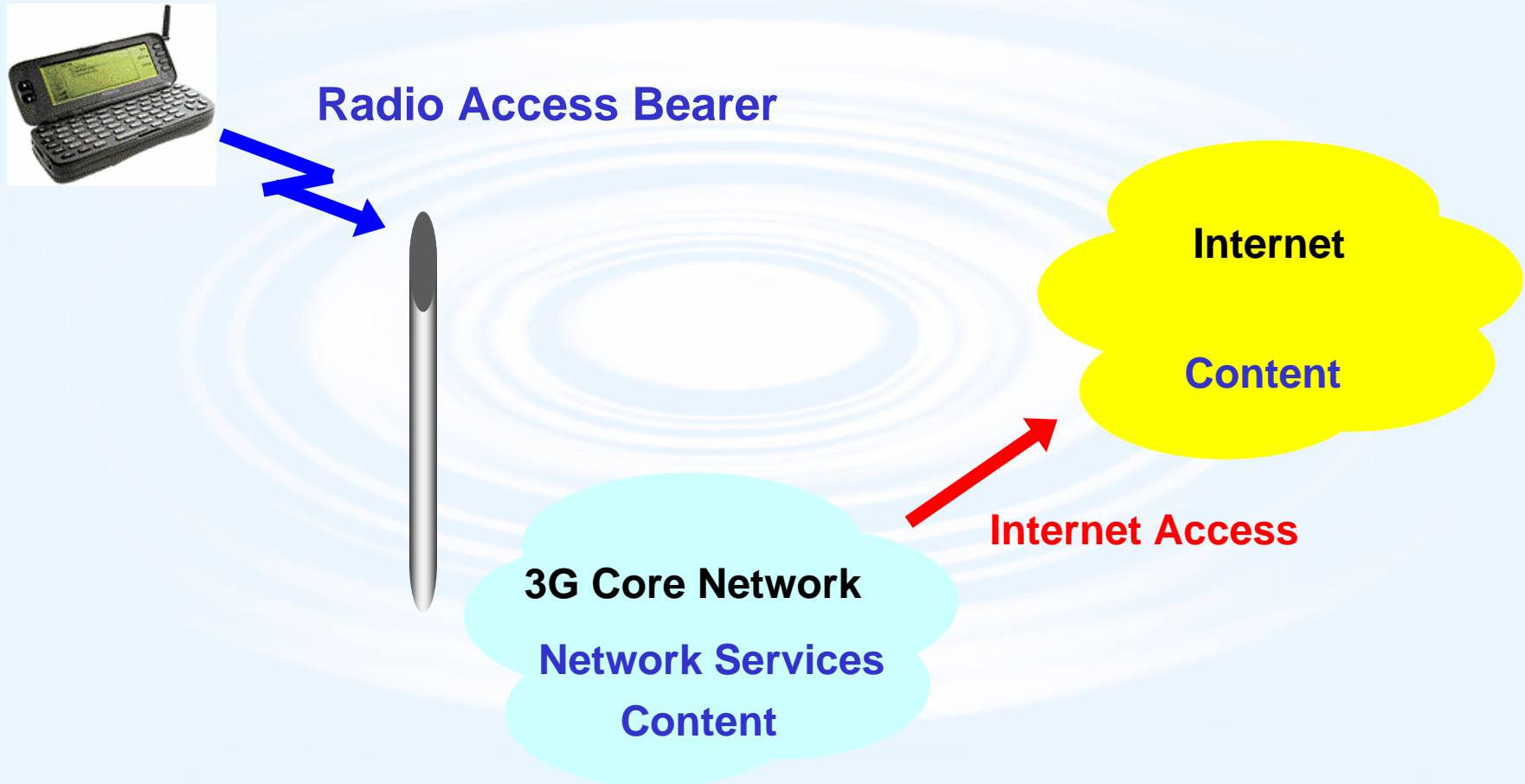


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There are several distinct service and cost elements in providing a mobile Internet access service to a customer



Based on these differences 3G operators can offer different services, ranging from walled garden content to full Internet access.



3G Network

Web Server
Hosted in
3G Network

Internet

E-Mail

Web
Server

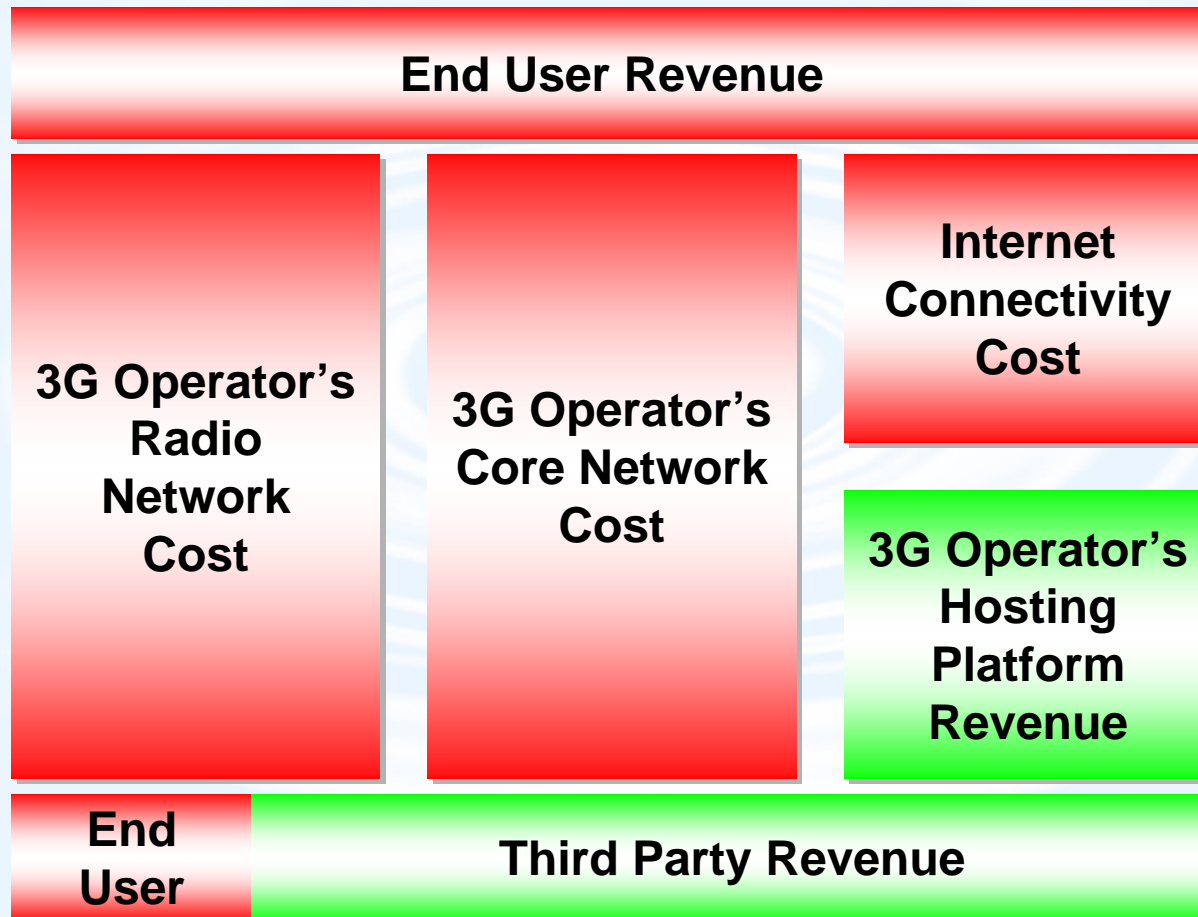


Hosting content in the network is a quality of service, pricing and cost issue.

- Traffic terminated on the Internet is a cost driver, whereas traffic terminated in the network is a revenue generator.
- Third parties whose is hosted in the network will not only pay for hosting services but also for the traffic generated by customers accessing their content. This is akin to a 0800 freephone service.
- Customers accessing content hosted within the 3G operator's network will not be exposed to the delays of the www. The 3G operator can ensure end-to-end quality of service and remove bottlenecks wherever they appear. This will result in a much better user experience in terms of delays.
 - Customers prefer shops without queues.



The question of how much the end-user pays should not be confused with the revenue generated.



While these new business models will emerge, the core telecoms activity will remain important.

- The Internet hype lead to unrealistic believes about the speed and important of new revenue streams.
- Conveyance, rather that content must be the main revenue source:
 - There is a substantial cost associated in the provision of wireless transmission capacity. The price of spectrum and the network must be paid for by revenue from conveyance.
 - The business models that are meant to drive new revenue streams are not established.
 - If GPRS / 3G is the mobile Internet, then it may also be difficult to make money from content.
- It is better to be a boring telecoms operator with a strong cash flow than in the dot com 90% club.



Conveyance is the only well established revenue source for telecoms companies.

• GPRS / 3G Claims

- ✘ There is no value in being a “dumb” bit pipe.
- ✘ Applications such as information, location services and m-commerce are required to drive demand for GPRS and 3G.

• Coleago's View

- ✓ Mobile bandwidth is and will remain a scarce resource from which substantial revenue can be generated. Prices for fixed access bandwidth are increasing.
- ✓ Yes, but Internet service provision grew rapidly without these “applications”. The application is the Internet, i.e. messaging and browsing.



Investors may want to assign different risk factors to different revenue streams:

- Take away the content revenue; does the business plan fly?

Low Risk

Voice Communications Paid for by End-User

Data Communications Paid by End-User

Data Communications Paid by Third Party

Content Revenue

High Risk



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While data volumes have to be an element in pricing, it should not be the only parameter.

- Pricing based on willingness to pay in the context of the application is more profitable than simple volume pricing. Therefore it is better not to have a single price per Mbyte.
- The GPRS pricing by Austria's operator One, is a way of discriminating pricing based on how much users are willing to spend.

Euro	Monthly Fee	Incl. Mbytes	In Bundled per Mbyte	Additional per Mbyte
WEB	6.00	10	0.04	0.85
WAP	6.00	0.1	3.36	21.20

- Generally the price per Mbyte for low volume applications is much higher than for high volume applications, what matters is that the overall price to the user is acceptable.
- However if price discrimination is very high, arbitrage may eventually take place.



The traffic generated will be a function of the bandwidth and the application.

- With a given access bandwidth, e.g. 128 kbit/s the potential monthly data volume throughput can be calculated:
 - 128 kbit/s divided by 8 = 16 kbytes per second
 - 16 kbytes per second * 60 seconds * 60 minutes * 16 hours per day * 30 days per month / 1,000 = 31,975 Mbytes per month
- A monthly volume of 100 Mbytes equates to 0.3% usage of the capacity.
- To a user 1 Mbyte means:
 - 333 e-mails @ 3 kbytes per e-mail
 - 250 WAP pages @ 4 kbytes per page
 - 67 html pages @ 15 kbytes per page
 - 45 A4 pages of text @ 22 kbytes per page
 - 2 good quality pictures
 - 0.2 3 Minute MP3 @ 5 MB
 - 0.14 30 second MPEG video clip @ 7 MB



Lower prices will allow increase traffic, but revenue is not simply a function of traffic and price per Mbyte.

	€/ MB
SMS	312.50
i-Mode	21.19
Voice @ 12.2 kbps	1.64
WAP	0.95
HSCSD	0.79
GPRS (lowest)	0.85
3G (lowest)	0.78



FOMA, the world's first commercial 3G service, of a high user tariff for delay tolerant data of €1.36 per Mbyte.

FOMA Delay Tolerant - Jan 2002

Monthly Subscription Yen	8,000	Including Yen 8,000 communication allowance.
Monthly Subscription €	69.57	
Price per Packet - Yen	0.02	For lower usage plans prices per packet are up to 10 times higher.
Size per Packet - byte	128	
Cost per Mbyte - Yen	156	
Cost per Mbyte - €	1.36	

FOMA 64 kbit/s Video / Data - Jan 2002

	Lowest	Highest
Monthly Subscription Yen	15,000	2,200
Monthly Subscription €	130.43	19.13
Monthly Allowance Yen	11,600	0
Peak per 30 Secs - Yen	21.5	30.5
Off-Peak per 30 Secs - Yen	15.0	21.5
Peak per Minute - €	0.37	0.53
Off-Peak per Minute - €	0.26	0.37
Cost per Mbyte - €	0.78	1.11

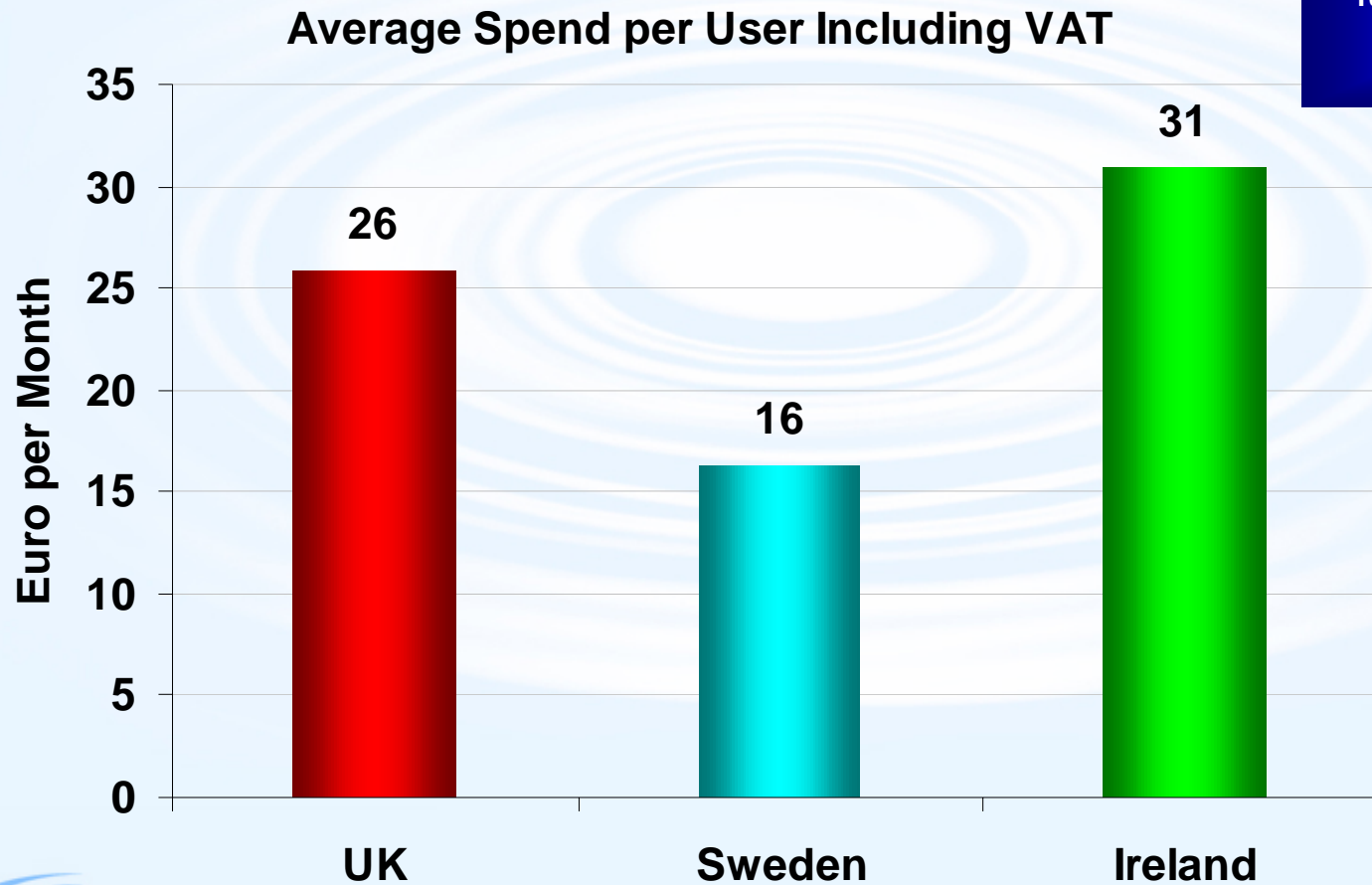


Empirical evidence suggests that the mass market is willing to pay Euro 30-40 per month for Internet access.

- ADSL and cable modem Internet access services priced at €30 to €45 per month appear to have mass market appeal.
- Prior to the introduction of free ISPs, a typical dial-up customer spent €15 per month for the ISP and another €15 on telephone charges.
- BT in the UK charges £14.99 per month for unlimited usage Internet access plus PSTN line rental £9.99 = £24.98 (€40)
- A cellular user who spends €30 per month may be willing to spend an additional €15-20 for the mobile Internet feature, including usage, i.e. a net of VAT revenue of around €14.
- This is substantial, considering that Q2 2001 cellular ARPU levels in Europe are around €27.



Market surveys indicate that potential mobile Internet access users are willing to spend €15-20 per month in addition to voice.



You can download the full survey report for Sweden from the Coleago website.

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Striking the right balance between fixed and variable tariff elements is a difficult balancing act.

- A minimum fixed element with a usage bundle will ensure a revenue floor. It reflects the high fixed costs of rolling out a network.
- Reliance on revenue from usage is dangerous because per Mbyte costs are a function of overall capacity utilisation.
- Tariffs with a high fixed and low variable element are easier to understand. The more pricing is skewed toward usage, the higher the incidence of bill disputes which creates costs.
- Very low usage related fees will necessitate a higher fixed charge, thus increasing the threshold price.
- Regulatory pressure to move to cost orientated pricing may lead to an overall rebalancing of tariffs with more emphasis on monthly revenue and less on revenue from incremental usage.
- A selection of bundled usage tariffs that meets user needs and budgets is best.



You can download related conference papers and articles from the Coleago website.

www.coleago.com

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