GPRS

Don't believe the Hype!

As the hype surrounding the introduction of GPRS technology grows it seems a good point to step back and take a realistic look at the services which may be introduced and, crucially from the service provider's point of view, how they will be billed.

G PRS is, after all, just a packet data service using existing GSM infrastructure to support it – the fixed networks have been doing it for years. It is, of course, the mobility of data usage that creates such a stir – the thought of

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internet access anywhere. However, what will make GPRS really appealing to the customer are the applications which are run over it and consequently how these applications are billed.

IP Centric

Although GPRS theoretically supports connection to traditional public data networks (X.25) the main focus has patently been to give the mobile user easy access to IP networks and all their associated services. The main services are therefore likely to be based around IP connections, services such as:
– internet access
– corporate LAN access
– location dependent information
  services
– email
– eCommerce
– WAP
All of these services, with the possible exception of location services and WAP, should be familiar from desktop PC experience. So, to a certain extent, GPRS facilitates the mobile desktop. GPRS will therefore be a significant change in usage and behaviour for GSM subscribers – as different as PC usage from telephone usage. As GPRS subscribers take their first shaky steps along the mobile multimedia road towards UMTS we must bill to encourage their usage not squash it.

Bill for what?

GPRS has been designed to allow GSM to resemble the LANs, WANs and internets it is connecting to and we conse-

quently lose the old GSM concepts of "making a call" in the telephony sense. Like a LAN user, the GPRS user will be "logged on" to the GPRS network but may or may not be actively using it at any one time. This leads to the concept of the GPRS user being "always connected, always online". Duration based billing comes from the traditional telephony voice circuit paradigm and obviously does not fit well into this GPRS concept. Charging by duration of connection would encourage users to log off after sending data and subsequently stifle usage – how much more would you use your home internet connection if it was always logged on and ready to go? We need to bill subscribers for what they use and encourage them to remain connected - volume based billing is key. However, in GPRS there are many other components which could be considered important or useful billing criteria:

Uplink/downlink Volume
GPRS gives us the opportunity to bill separately for data going from the user to the network or vice versa. This provides the opportunity to offer novel tariff services e.g. free access, pay for download.

Quality of Service
Quality of Service (QoS) gives an indication of the priority, throughput, reliability and delay on a GPRS service. You can ask for QoS A, but you may get QoS B. So the ability to offer discounts for failing to meet a requested QoS, as is available in fixed line services, may well be a requirement. However, QoS is a very grey area. It is relatively poorly defined, it only applies to the GPRS network not to the end-to-end connection, and has the potential to completely confuse the customer when it appears on their bill. Billing for QoS must be very carefully applied and applied according to the target customer. The telecoms manager of a large corporate will want to specify a

QoS requirement and will want discounts if the service falls below the specified level. Joe Public who bought his GPRS handset because it was blue doesn't care so long as his internet access is OK.

Content
Content billing is another area of much hype. GPRS falls down badly in this area as it can only identify the Access Point Name (APN), such as an internet portal, in use by the subscriber. Each item of web content accessed after this is unknown. Obviously the network operator could define lots of APNs to further discriminate content but this could become a logistical nightmare. A better option may be to leave content billing to higher level applications, such as TCP/IP or WAP, which are much better suited e.g. bill GPRS for access and QoS, WAP for applications and content.
One important point to note with content is that we should not overbill. The internet is currently relatively free of content billing which is part of its popularity – the ability to go anywhere, look at anything without the threat of a huge bill later. If we bill for each item of content accessed we would kill the usage and would have hundreds of CDRs for each short internet session. Billing costs would probably overtake revenue. Content should mean very specific, high quality content.

Terminal used
GPRS terminals come in many different flavours. We can have the plug-in PCMCIA card that does GPRS only, the simultaneous GSM and GPRS terminal, the GPRS or GSM terminal. Subscribers with different terminal capabilities experience different service, have different requirements and usage patterns – we may want to differentiate their charges accordingly.

Origination Location
The originating location of a call has often formed one of the main criteria for telecoms billing. However, in GPRS, as connection times are so long, where the connection was originated may be hun-

dreds of miles from where it finishes. If we charge by originating location it will need to have a real-time element.

Bill how?

So the main billing criteria we could use has been mentioned – now the question is how do we mix all these factors together to produce a bill. This is not the question you should be asking. First ask: Who is my customer? Then ask: What have they wanted in a conventional GSM bill? And finally ask: How much do they understand about data?

Corporate Customers

Let's take a look first at the faithful early adopter – the corporate customer. We can assume the corporate customer will have many GPRS subscribers, will be reasonably technically literate and will want both high level summaries and details of subscriber usage. Their GPRS subscribers will also probably be GSM subscribers so they will need not only volume discounts but cross service discounts. See figure 1 for an example of a possible corporate bill extract.

Consumers

Consumers will not be a significant GPRS market until terminals are widely and cheaply available. Consumers do not need such detailed information and are unlikely to understand the intricacies of a QoS level. They want service appropriate to their needs and a refund if the service

is unusable rather than a little below par. The onus therefore falls on the operator to hide the confusing detail from the subscriber but provide enough to avoid a surge of customer care calls. So in the consumer environment we might see more package plans with bundled volume, tiered tariffing and simple statements of data usage (fig. 2). Eventually we may see an entry level offering for consumers – prepaid GPRS, as ETSI already plans to investigate this area.

As GPRS users become more mature we can expect to see top end consumers, who are becoming data literate, start to demand QoS guarantees and discounts for poor service we expect in a corporate market. Corporates may want to define their own QoS levels for each application their employees use. Flexibility in a GPRS system will be very important.

Bill with what?

GPRS will produce significantly more CDRs in a significantly different service to GSM. So should we be using a GSM billing system to bill for it? Yes. GPRS may be different but it is fundamentally based on GSM concepts, GSM data structures (HLR), GSM identifiers (IMSI) and to a certain extent GSM CDRs (SMS). And let us not forget international roaming. To charge for GPRS use whilst roaming you need a billing system which supports TAP3 and the systems which will support TAP3, and have the experience of previously supporting TAP

and roaming, are GSM billing systems. So, some front end systems may offer a quick solution to GPRS mediation and simple charging, but GSM billing systems are extremely well placed to provide end to end support for business critical functions. KSCL's Jupiter system has been a prominent player in the GSM and wireline billing arena. Our experience lets us look at GPRS and identify areas where GSM and wireline systems experience can be used to support GPRS. This is not only at front end network technology level but throughout all the back office systems, which are needed to support a commercial service, often forgotten by media hype. A vendor, or even an operator, without this breadth of knowledge may find a long term, scaleable GPRS billing solution difficult to develop.

And finally

GPRS is undoubtedly a big service and technology change for network operators. However, existing billing systems are well placed to build on their circuit switched GSM and wireline knowledge to provide the solution to the GPRS billing problem. [1]

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Fig. 1. Corporate bill.

Corporate Cover Page			
GSM and GPRS discounted monthly charge			US-$ 400
Data Usage Summary			
Connection to Corporate Intranet			
25/4/00	off-peak	40 Mbytes	US-$ 80
2/5/00	off-peak	70 Mbytes	US-$ 140
10/5/00	peak	50 Mbytes	US-$ 200
Average QoS = 5			
Requested QoS = 6			
Discount applied 5%			US-$ 21
Free volume allowance			US-$ 50
Subtotal			US-$ 349
Connection to ISP			
24/5/00	peak	80 Mbytes	US-$ 400
Average QoS = 6			
Requested QoS = 6			
No discount applied			
Subtotal			US-$ 400
Total data charge			**US-$ 749**

Consumer Bill			
GSM and GPRS discounted monthly charge			US-$ 40
Data Usage Summary			
Connection to Freebie Intranet			
28/4/00	off-peak	0,5 Mbytes	US-$ 1.00
8/5/00	off-peak	0,4 Mbytes	US-$ 0.80
10/5/00	peak	0,5 Mbytes	US-$ 2.00
Connection to GSM network ISP			
24/5/00	peak	2 Mbytes	US-$ 6.00
25/5/00	off-peak	1 Mbytes	US-$ 1.50
Subtotal			US-$ 11.30a
Free volume allowance			US-$ 5.00
Total data charge			**US-$ 6.30**

Fig. 2. Consumer bill