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***A Summary of NGNuk Member views on potential Charging
Mechanisms for PSTN Emulation over NGNs***

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This paper “*A Summary of NGNuk Member views on potential Charging Mechanisms for PSTN Emulation over NGNs*” was written by Ellare and Oxera with the support and assistance of the NGNuk membership

Ellare was established by Stuart Newstead in 2002 as an independent consultancy in fixed and mobile telecommunications. Stuart has 25 years senior experience in the industry and was a former Vice President at mobile operator O2 and General Manager at BT. Ellare’s philosophy is to draw on its wide network of associates, all senior figures from the relevant industry or sector, to bring to bear the right skills for specific projects. For this project Stuart has been joined by Leo Borwick, a consultant and specialist in pricing and regulation, who was formerly a senior manager at BT.

Oxera is an independent economics consultancy—one of the largest in Europe—with an international reputation for integrity, intellectual rigour and work of the highest quality. Since its inception in 1982, the company has been offering economic advice using a combination of extensive industry knowledge and unsurpassed expertise in industrial and quantitative economics and corporate finance, placing it at the forefront of developments for company strategy, government policy, competition law, and regulation.

EXECUTIVE SUMMARY

NGNuk has been established to anticipate and address commercial issues that may arise from interconnection between next-generation networks. As part of this remit, it became clear that a charging mechanism is required for PSTN Emulation (PE) over NGN interconnects.

We have previously¹ reviewed whether internet-style “bill-and-keep” charging principles would be more efficient than the existing approach when applied to voice and messaging services on NGNs. We found that efficient investment is most likely to be supported when the network of the party most likely to benefit from a call or message continues to pay for the call. This basic economic principle is equally applicable to NGNs as it is to the current generation of networks.

In this paper NGNuk goes on to consider which charging structure best supports the chosen charging principle. A mechanism like the existing one, i.e. “Usage-Based Charging” (UC), was compared with two alternatives; “Port Charging” (PC) and “Capacity Charging” (CC). The comparison was based on a structured questionnaire to NGNuk members that allowed quantitative and qualitative analysis.

This paper does not address which costs are relevant, how fixed and common costs are treated, the allowable return on capital, etc. Such decisions are separate from any decision on charging structure.

Members indicated their preferred charging structure, including suggested variants, taking an analysis paper prepared by the Secretariat as input. The paper set out five goals for any new structure:

1. Protect and enhance user experience
2. Provide a smooth transition for both operators and users
3. Consistency and efficiency with NGN design and operation
4. Encourage economically efficient NGN design
5. Flexibility and clarity within the charging mechanism.

Respondents also rated (i) the importance of each goal to their company and (ii) how far each structure allowed that goal to be reached, together with a brief explanation of their reasoning.

Of those operators responding, eight favoured Usage Charging as their preferred option and three favoured Capacity Charging. Of these three, one rated CC only marginally ahead of UC.

Generally respondents scored UC higher than CC overall against the five high-level goals, except for 3. (Consistency with NGN) and opinion was evenly divided in relation to 2. (Economic efficiency).

UC scored higher than CC on the smoothness of the transition to the new system and the flexibility and clarity of the structure and was rated as more likely to protect and enhance users’ experience.

In discussing the results within the NGNuk Commercial work group the consensus view was that the results indicated that a move to capacity charging at this time was seen as risky as the outcome and costs were not understood. Generally, however, the group accepted that the results indicated that capacity charging was most likely to be the more efficient basis for a long term cost orientated charging model for NGNs supporting a range of interconnected services.

The recommendation of the Commercial group to the Executive was to develop an “interim” charge framework for voice based on usage with a target availability for the end of the BT Network Charge Control in October 2009. This usage scheme should, however, seek to reflect NGN economics and architecture better than would be the case should today’s PSTN tariff structure be adopted.

¹ In the NGNuk paper “NGN Interconnection: Charging Principles and Economic Efficiency”.

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1 Background to the project

NGNuk has been established to anticipate and address commercial and technical issues that may arise from interconnect to next-generation networks. As part of this remit, it became clear that a charging mechanism is required for PSTN Emulation (PE) over NGN interconnects. The move to a new and fundamentally different technology prompted the question of whether the existing charging mechanism remains the most suitable, or whether it should be replaced by something potentially simpler and more economically efficient. PE is regarded as a useful test of concept for approaches that might be applied to further new NGN products, in that it combines familiar services with new technologies, as well as being an important wholesale product in its own right.

In the NGNuk paper "NGN Interconnection: Charging Principles and Economic Efficiency" we reviewed whether current interconnect charging principles or Bill and Keep will be more likely to promote dynamic and static efficiency gains when applied to voice and messaging services on NGNs. We found that efficient investment, an objective of both EU and UK law, is most likely to be supported by continuing with a system whereby the network of the party most likely to benefit from the transfer of a call or message continues to pay for the call. In this way networks are most likely to recover investments from calling or called parties who gain most. This basic economic principle is equally applicable to NGNs as it is to the current generation of networks.

A mechanism similar to the existing approach i.e. "Usage-Based Charging" (UC) was compared with two alternatives; "Port Charging" (PC) and "Capacity Charging" (CC). The comparison was based on a structured questionnaire to NGNuk members that allowed quantitative and qualitative analysis.

This paper does not address which costs are deemed relevant, how fixed and common costs are allocated and recovered, what is the allowed return on capital, etc. Such decisions are separate from any decision on charging structure.

2 Options for NGN interconnect pricing

2.1 Usage-based charging (UC)

The system traditionally used for most PSTN services. Under UC, charges to communications providers (CP) are based on combinations of connected call duration (and sometimes a fixed charge per call) and the extent of network elements (theoretically) used on each call. Charges are linked to the dimensioning of networks for peak demands by varying them for different times of day (the "tariff gradient", typically Day/Evening/Weekend).

2.2 Port-based charging (PT)

The essence of PT is that wholesale customers of an operator pay a charge per port or virtual port, which covers all conveyance costs up to the capacity of the port (normally multiples of 2Mbps with today's technology). In principle this would mean a very straightforward and tangible relationship between what a customer gets, i.e. the ability to transport information across the interconnected network up to the port's capacity, and what they pay for and minimal requirements of any billing system. Note that real time management of the PT could, though, be extremely costly and complex.

2.3 Capacity charging (CC)

Under the simplest form of capacity charging the total amount that a CP would pay an interconnecting network would be driven by the peak demand it placed on that network within some time period

(month, year, etc). Additional usage of the network outside that peak (e.g. in the middle of the night) would not result in any additional charge. However, additional usage at the peak could result in a very large increase in the charge. The unit price for this capacity would be set in advance on the basis of forecast capacity usage, in an analogous way to pence-per-minute prices under UC.

3 Analysis of operator feedback

3.1 Approach taken

Previous work by the NGN Commercial Working Group had established a number of principles that any charging structure should meet. To ease analysis, the principles were grouped into five overall goals, with sub-goals and with the addition of supplementary questions where appropriate. The high level goals were as follows:

6. Protect and enhance user experience
7. Provide a smooth transition for both operators and users
8. Consistency and efficiency with NGN design and operation
9. Encourage economically efficient NGN design
10. Flexibility and clarity within the charging mechanism.

Members were requested to identify their preferred charging structure for NGN conveyance (ie for PSTN Emulation), including variants within their preferred structure, taking an analysis paper prepared by the Secretariat as input. The ten respondents² also rated (i) the importance of each goal to their company and (ii) how far each structure supports that goal. In each case they were then asked to provide a brief explanation of the reasoning for their scores. Subsequently members were interviewed to ensure that their output was fully understood and correctly interpreted.

3.2 Main results from analysis

Of those operators responding, eight favoured Usage Charging as their preferred option and three favoured Capacity Charging. Of these three, one rated CC only marginally ahead of UC. As no operator favoured Port Charging, this paper focuses, for simplicity, on the comparison of output for the Usage and Capacity Charging options.

Generally respondents scored UC higher than CC overall against all of the five high-level goals, except for “Consistency and efficiency with NGN design and operation”; opinion was evenly divided in relation to “Encourage economically efficient NGN design”.

UC showed a strong scoring advantage over CC in relation to the expected smoothness of the transition to the new system and the flexibility and clarity of the structure and was rated as being more likely to protect and enhance users’ experience.

² Eleven operators participated in the data gathering stage, but one respondent’s contribution arrived too late to be included in the analysis.

4 Conclusions

In discussing the results within the NGNuk Commercial work group the consensus view was that the results indicated that a move to capacity charging at this time was seen as risky as the outcome and costs were not understood. In addition, the peak load on today's domestic fixed networks is spread reasonably evenly across waking hours, so UC and CC are not likely to result in very different prices in practice.

Furthermore, there appeared no significant catalyst for change at this time as new products and services were not well understood or defined and hence difficult to reflect within the charging structure. This made accessing alternative charging mechanisms problematic.

Maintaining usage charging was therefore seen as having minimal impact on the Consumer experience in the short term and that developing UC to reflect NGN efficiencies better would facilitate the easiest transition for PSTN emulation.

In addition the commercial work group felt that at this time capacity charging would need to be supplemented via an overlay charging scheme for services where significant outpayments are involved, such as PRS, international and mobile, which seemed to counteract any efficiency gains obtained by the potential change.

Generally, however, the group accepted that the results indicated that capacity charging was most likely to be the more efficient basis for a long term cost orientated charging model for NGNs supporting a range of interconnected services.

The recommendation of the Commercial group to the Executive was to develop an "interim" charge framework for voice based on usage with a target availability for the end of the BT Network Charge Control in October 2009. This usage scheme should, however, seek to reflect NGN economics and architecture better than would be the case should today's PSTN tariff structure be adopted.

5 Further Information

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