

A Summary of NGNuk Member views on specific charge factors
that might be considered for a usage based charging framework
for PSTN Emulation over NGNs

NGNuk
3rd Floor, Riverside House
2a Southwark Bridge Road
London,
SE1 9HA

Telephone +44(0)207 7834688
Fax +44(0)2077834700
Email peter.ryde@ngnuk.org.uk

Website www.ngnuk.org.uk

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1 Introduction and Objectives

Following the recommendations of the Commercial Group to the NGNuk Executive regarding the principles to be adopted in support of voice emulation over NGNs it was asked to consider the basis of the charging structure between usage, port or capacity based charging options.

The subsequent recommendation of the commercial group to the NGNuk Executive was to develop an “interim” charge framework for voice emulation based on usage. It was hoped that this could be available for the end of NCC in Oct 2009.

During this work the commercial group considered capacity based charging as the likely long term solution for billing of NGN interconnection. However, even if the current NCC was to be extended by Ofcom there appeared to be insufficient drive from operators to develop such a scheme in line with the availability of voice emulation.

The commercial group also recommended that the usage scheme for voice emulation should however, seek to better reflect NGN economics and architecture than would exist via an extension of today’s PSTN charge structure.

The NGNuk Executive accepted these recommendations at the November 2007 executive meeting as a pragmatic approach, given industry status on NGN deployment, business risk, consumer impact etc.

The next steps were agreed by the Executive as being the identification of the level of consensus amongst members regarding the types of usage model that might be adopted, clarification of the respective positions of members and an understanding of the support across the membership for and against specific charge factors.

2 Approach

Some initial feedback from a small number of members was provided. This was used to identify the key elements of the PSTN charging structure and potential new factors which needed to be considered for NGNs.

Members were asked to consider:

- For each element of the existing PSTN charge framework the ongoing validity within an NGN environment, why this is the case and its degree of relevance
- Which new factors should be adopted within a voice emulation charge framework, why and their degree of relevance

Interviews were sought with all members and 14 undertaken. The following CPs contributing: BT, Colt, CPW, CW, H3G, Orange, Sky/Easynet, Thus, Tiscali, T-Mobile, VirginMedia, Verizon, Viatel, Vodafone.

All feedback from these interviews was recorded by the NGNuk Secretariat and validated with the CP prior to inclusion. All feedback was anonymous. This feedback is detailed within Appendix A. Note: In the version submitted to Ofcom the source who provided feedback will be identified.

Once completed the results were published to the NGNuk Commercial Group for debate.

This paper provides a summary of the feedback and the outcome of these discussions including any relevant comments from the Executive review.

3 Summary of Results

In summarising the results it became apparent that a number of factors could be considered in isolation with no linkage or interdependence between them. These have been termed “individual factors”. A second group were highly interdependent and have been termed “linked” factors. These two groups are detailed below:

Individual Factors:

Time of Day
 Duration
 Volume Discounts
 QoS
 Type of Call
 Reciprocity
 Ported Numbers

Linked Factors:

Distance
 Number of Elements
 Rural vs. Urban (Dense MSAN vs. Non Dense MSAN)
 Call set Up

3.1 Individual Factors

3.1.1 Time of Day (T.O.D)

All respondents had indicated that they believed the future charging regime for voice needed to retain a T.O.D. element. This consensus was confirmed by the commercial review.

TOD charging was felt to promote efficient network usage by incentivising the use of periods of under utilisation and by providing accurate signals to the market. Both bandwidth (albeit voice will be a small part of the overall bandwidth capacity in the longer term) and call processing elements of the network will have to be dimensioned for the busiest hour and will benefit if the use of a time of day pricing can help flatten out the usage profile. It was not felt that there needs to be a link between retail and inter-operator charge frameworks as individual operators can assess the risk at the retail level of removing TOD elements from retail charging. It was accepted however, that the effectiveness of TOD as a market signal might increasingly reduce as retail tariffs tend towards “flat rate” and therefore less TOD dependent.

It was suggested that the time of day charging needs to be differentiated by network element since different network elements might have differing time of day profiles within an NGN. Applying one average time of day profile for all elements might send the wrong signals to other operators. This was not developed further during the group discussion and will need to be considered once an initial framework is proposed.

3.1.2 Call Duration

All respondents indicated that the future charging regime for voice needed to retain call duration as a charging factor. This consensus was confirmed during the commercial review.

Whilst the proportion of costs to establish the call are higher than for PSTN, the length of time that capacity is reserved to carry voice traffic is still dependent upon the duration of the call hence it retains its relevance. Despite flat rate tariffs in the retail market they are still covered by “fair use” policies or limits to the size of bundle which require call duration to be captured. If the wholesale charging mechanism did not reflect retail charging then the wholesale market would be carrying an unnecessary level of risk.

The conveyance related part of usage-based charging should remain per-minute as at present (but with option of pence per minute, pence per call, or 2 part charging for NTS/PRS) . This, whilst not perfect as a unit of measurement still has many practical advantages e.g. existing billing system capabilities which will minimise operator development cost.

3.1.3 Volume Discounts

It had been suggested during the preliminary discussions, that the charging structure should include a volume discount to reflect the economics of size and direction of traffic between different carriers. The majority of operator feedback did not support this suggestion. When discussed within the commercial group there were no advocates for introducing volume discounts.

Whilst it was accepted that there will be some economies of scale it was agreed that these needed to be realised either via way that operators make use of fixed cost elements (e.g. their interconnect links) or that the charging framework itself needs to reflect economies of scale and scope. It should not be reflected through any reduction in price per minute or per call.

Volume discounts were also felt to discriminate against smaller players, to restrict competition and disadvantage new entrants so were not supported by the group.

Finally the group felt that if volume discounts were introduced they would introduce unnecessary complexity into the supporting regulation.

3.1.4 Quality of Service

Two respondents felt that QoS was relevant to voice services over NGNs however, this was a qualified response. It was felt that charging for QoS would only be relevant if services requiring varied levels of QoS were introduced over NGNs. Whilst not relevant for PSTN emulation or the currently planned implementations of voice it was considered that this might become relevant at some point in the future.

The majority of respondents did not consider charging or QoS had any relevance as no voice applications requiring differential QoS are anticipated at this time that require this.

It was assumed that a single “gold” quality level would apply between operators to support PSTN emulation and that it is essential that NGNs (fixed and mobile) adopt QoS standards that will deliver acceptable E2E QoS. The main concern expressed relating to QoS was with respect to how operators might check that the level of quality being provided, and the commercial terms covering situations where it is not delivered.

For the purposes of wholesale voice charging the group did not see a requirement for differential charging of QoS. For “other” future services, as yet defined, they considered these might benefit from QoS charging differentiation in order to send appropriate economic signals to the market.

3.1.5 Reciprocity

Reciprocity currently only applies for voice charging between fixed operators. As such the MNOs did not consider reciprocity a mobile issue and therefore, considered it as a topic which should be taken outside of the charge framework.

Across all respondents however, there was a majority who felt that reciprocity was relevant to the charging, although this was qualified by stating that whilst important it should not form part of the charge framework itself.

This group felt that by incorporating reciprocity into discussions on the charging framework they could become very complicated, as some potential aspects that would be difficult to deal with on a reciprocal basis (e.g. urban/rural) within the charging framework. However many also felt that without resolution of how reciprocity might apply there is a danger that regulation could become burdensome. Some operators however, expressed concerns about how the existing scheme has operated and that greater regulation whilst burdensome might be a fairer approach.

Overall it was agreed that reciprocity is not an issue for the charge framework but is something that needs to be addressed in parallel to the development of the charging framework, possibly with greater symmetry across Mobile and Fixed

A view was expressed that reciprocity should be dealt with by Ofcom since it relates to industrial policy i.e. how much and how does Ofcom want to encourage competition, and is therefore not something that industry should be deciding itself.

3.1.6 Ported Numbers

A small majority of respondents felt that charging framework should reflect the introduction of the CDB and penalise operators who do not use the database and misroute traffic e.g. by requiring the originating operator to pay the costs of onward routing.

There was however a broad consensus across all operators that there needs to be an incentive to use the CDB information.

The disagreement, if it can be described as such, centred on whether this “incentive” would or would not form part of the work of UKPorting.

At the Executive during a discussion of the overlap with UKPorting and NGNuk’s role in establishing any principles Peter Black (Executive Chairman, UKPorting) stated that such work was outside of the scope of UKPorting.

3.2 Linked Factors

The feedback from Operators who attended the commercial meeting to review the feedback was a unanimous consensus around a desire for the charge framework to reflect the cost of the underlying network elements. However, there was no clear agreement on what should constitute these. The feedback is summarised below although no conclusion is presented.

3.2.1 Number of Elements

All but one respondent accepted the need to accurately reflect the underlying network elements within the charging framework such that charges reflect the underlying network costs and incentivise efficient connectivity and routing.

It was accepted that calls not delivered to the correct PoSI should incur an additional charge to set the correct economic incentive.

It was also suggested that in identifying the correct network elements the work needs to reflect 21CN but also maintain links with underlying BT network elements and that there needs to be sufficient granularity of detail since over averaging could distort market signals.

3.2.2 Distance

The majority of operators stated that distance remains relevant in NGNs since a significant part of the underlying cost will still be linked to the distance a call travels. However, it was accepted that if the charges are sufficiently element based the distance differentiator may be masked in NGNs, as the element based charge may sufficiently capture the distance element of underlying costs.

Some of those operators who supported the validity of distance-dependent charging did so to avoid undermining CPs that have historically invested in building out their own network and to incentivise future infrastructure development where appropriate. However, some of those operators who did not support distance related charging were concerned that protects existing network investments and therefore creates a future barrier to entry.

Those supporting distance based charging accepted that distance has less relevance for NGN than for PSTN/TDM however; there were concerns that too simple a model which ignores any form of distance gradient would have a detrimental impact on competition. This was a general view held by MNOs who wished to retain a competitive wholesale in an NGN world.

Some of those operators not supporting a distance based accepted that introducing retaining a distance based element would be a conservative option. They were however, concerned that doing so would create the risk that costs are not properly

reflected in the charges and that this could lead to a distortion within the market and to over or under recovery of costs

Those who did not support the relevance of distance did consider distance itself as not being a significant driver of cost, especially across the core. They considered that costs will be dependent upon the traffic density and technology deployed.

3.2.3 Rural vs. Urban (Dense MSAN vs. Non Dense MSAN)

Three operators supported the introduction of a charging structure that differentiates between dense and non dense cells. It was felt that core conveyance costs would be a minor factor due to the impact of technology and that the key determinants of cost would be the underlying transport architecture from the correct PoSI to the MSAN and the density of the MSAN itself.

In terms of the BT network it is argued that the balance of costs between 20CN and 21CN is markedly different. Call Origination and Termination on 20CN were to and from 100s of local exchanges and the distances from the core were much shorter than will be the case for 21CN. Furthermore there are significant cost differences in the supporting infrastructure for 21CN between Tier1, Tier2 and Tier3 MSANs , and between dense cells and non-dense cells.

One of those operators supporting this approach did stress however, that whilst the utilisation of MSAN is key determinant the classification must reflect their own network not 21CN. Indeed one of the key concerns of those who did not support this approach was that the definition of rural / urban would not reflect their own network costs and that information sources (such as cost and demand data by Post Code) are insufficiently detailed to be used as the basis of such charging.

The majority of respondents did not support the introduction of a charge framework based on cell density. This was for a variety of reasons as follows:

- Some operators were not convinced that there is as direct link as claimed between technology and MSAN footprint and cost.
- Operators considered that with a limited number of high level interconnects it precludes the option of any build or buy decision to reach the rural or urban MSANs, so there is no opportunity to modify routing behaviour
- Operators thought this may be politically unacceptable should scale of wholesale charges between rural and urban be such that they flow through to retail tariffs. In addition, questions were raised over whether such an approach would have an impact on the USO and whether the underlying rationale for change would be understood or accepted by consumers.
- There was concern expressed that the rural/dense definitions may differ between operators causing confusion but also that these could change over time. As such they could therefore, be open to further interpretation and reclassification (with an increasing differential between the extremes of rural and urban communities).
- Operators were not convinced that there is an obvious economic rationale for de-averaging

- Some operators considered that such an approach would not only introduce unnecessary regulatory complexity but also an incentive to over-recover cost in rural areas

3.2.4 Call set Up

Call Set Up was discussed at two levels. The first related to whether, as a general approach it provided for an improved charging structure. The second was in the context of 21CN where some operators suggested that the underlying costs of 21CN could be better represented by splitting the call control and session management costs from that of the media.

General

Operators considered that for all networks signalling and call set-up is likely to form a larger part of the cost stack than for TDM and that there was therefore a case that these costs should be reflected within in the NGN charging structure for voice emulation.

This had been considered at an earlier phase by the commercial group. It was accepted that for voice emulation on an NGN the overall proportion of cost associated with call control and session management will be higher than over a TDM network. On review it was agreed however, that for voice services this proportion was likely to be stable on an NGN. Under such circumstances it was considered probable that the costs could be averaged within the usage charging. This would not be the case for new services requiring greater numbers of simultaneous sessions where these costs could be a considerably greater.

There was support from five operators that one might consider introducing a call set up charge to provide a forward looking element to facilitate future charging enhancements such as charging for codecs, varying bandwidth requirements, QoS etc and thereby ensuring greater flexibility within the charge structure. This was countered by the view that Call Set Up charges are already part of the tariff structure for NTS. The functionality to support this therefore exists which allows it to be introduced as, when or if required. These operators felt therefore, that premature introduction would add a level of complexity without any clear requirement or benefit to the charges associated with existing call types

Some operators expected the cost of bandwidth to fall faster than the costs associated with the call set-up (e.g. signalling, call servers etc) and therefore call set up will become an increasing proportion of the costs. They considered that a pricing structure that includes a call setup fee (for successful calls) will help ensure that charges are better matched to costs in the long term.

Those operators who were against the introducing call set up charges felt that as this is not currently charged for standard calls customers could be confused by changes to the charging regime should they flow through to retail tariffs.

Splitting Media and Call Control costs

For the majority of operators considering the revised charging framework their largest consideration was ensuring that it will accurately reflect the 21CN cost drivers. The 21CN BT is anticipated to use between 5 - 8 call servers per handover with circa 40 in total for the overall network. Both the IP Border Gateways and MSANs are expected to be under the control of the call server .This could be a single call server or could be two different ones.

Some operators who participate within the technical discussions associated with Consult 21 discussions indicated that BT had stated that when a second call server is utilised call control costs will be (circa) an additional 60% over using a single call server. It was suggested therefore, that if the charging regime split out call control from the media costs, by interconnecting at the right call server CPs could seek to minimise call server costs To allow the same call server to control both the IPBG and MSAN there would need to be between 5 - 8 parallel media paths at each handover, each under the control of a given BT call server.

Whilst it was accepted this approach would favour larger operators there was a high level of consensus amongst the group that this was acceptable if it helped facilitate an ongoing wholesale market.

Such an approach would require charging to be split as follows:

	Charged Per Call	Charged on Usage (p.p.m.)
Media	No	Yes
Call Control	Yes	Weak *

** Ongoing costs of call control will be weak but need to be ascertained to conclude whether these could be significant overall.*

Appendix A

Member feedback on Individual Charge Factors

Charge Factor

Distance

New or Existing factor?

Existing

Company	Relevance	Reasoning
1	Relevant	Distance is still relevant in NGNs as a significant part of the underlying cost is related to the distance a call travels. However, if the charges are sufficiently element based the distance differentiator may be masked in NGNs, as the element based charge may sufficiently capture the distance element of underlying costs
2	Not Relevant	Distance has little relevance in an NGN world, though the conservative option would be to retain some distance element within the charging. However, there is a danger in doing so that this creates the risk that costs are not properly reflected in the charges and that these lead to a distortion within the market and over or under recovery of costs.
3	Relevant	Distance is still relevant in NGNs and distance-dependent charging should be retained to avoid undermining CPs who have invested in building out their own network and to incentivise new investment where appropriate. The distance-related part of charging should continue to follow an element-based charging approach (rather than e.g. crow-flies distance or average distance).
4	Not Relevant	Distance in itself is not a significant driver of cost, especially across the core. Costs will be dependent upon the traffic density and technology deployed. A better reflection of how distance affects costs would be element based charging.
5	Some Relevance	We expect that the costs of bandwidth are reducing significantly within NGNs and therefore will form a much lower proportion of the costs and hence distance will be less important than it is today. However, there will still be some relevance and we think this is best reflected in some form of 'element based' approach where typically the longer the call the more elements are required. A 'per km' is not expected to be necessary. Probably it will be sufficient to determine only whether or not a call makes use of the core network and not necessary to further de-average different amounts of core network usage.
6	Not Relevant	Distance related charging protects existing network investments and therefore creates a barrier to entry. With the cost of pure bandwidth reducing backhaul costs are less significant. This is evidenced by more instances of national flat rate connectivity pricing. It is however relevant to say that some element of distance related charging might be covered by charging per "number of elements".
7	Some Relevance	Distance has relevance however; this is less than for PSTN/TDM. Despite this lesser relevance we have concerns that too simple a model which ignores any form of distance gradient would have a detrimental impact on competition.
8	Some Relevance	The current PSTN interconnect regime with its deep interconnect is a reasonable proxy for distance. Whilst we feel that distance is less important in an NGN environment we feel that charges should in some part reflect some distance element
9	Not relevant	Distance loses its significance in an IP environment, where different parts of the same message can be carried over

		different routes raising questions over measurement and billing.
10	None	
11	Some Relevance	Whilst distance is less important in an NGN environment we feel that charges should in some part reflect some distance element if only to maintain a competitive transit market.
12	Some Relevance	We see that distance has some relevance but less so than in the past. We would typically see distance related charging as less accurate to element based charging but recognise that it can sometimes act as a good proxy for cost.
13	Small Relevance	Distance only relevant to the extent that the number of network elements increases as distance increases. Charging by element a better proxy for underlying costs than distance.
14	Relevant	Distance will be a cost driver but to what extent is not clear due to the lack of evidence. Element based charging may be an acceptable proxy for distance. Those CPs that are investing in NGNs are better placed to understand their own costs. The adopted cost elements should not over simplify underlying cost drivers nor should to a high a level of cost averaging artificially eliminate a strong competitive environment for e.g. transit services.

Charge Factor

Time of Day

New or Existing factor?

Existing

Company	Relevance	Reasoning
1	Relevant	The capacity of the network elements reserved for voice calls are dimensioned around the busy hour which means that the time of day that a call is made is still relevant in NGNs
2	Relevant	This promotes efficient network usage by incentivising the use of periods of under utilisation
3	Relevant	Some form of ToD-based charging is needed to provide the correct signals to encourage efficient use of the network. The current ToD categories (Day, Evening, Weekend) may need to be reviewed to check that they still optimal in light of current network utilisation profiles.
4	Relevant	Promotes efficient network usage by incentivising the use of periods of under utilisation.
5	Relevant	Both bandwidth related and call processing elements of the network will have to be dimensioned for the busiest hour and therefore there will be benefits if the use of a time of day pricing approach can help flatten out the usage profile. However, it is accepted that the ability to do this will be reduced if retail tariffs become even less time of day dependent and therefore the relevance of this could reduce.
6	Relevant	Agree with points 1 & 4 above. There should be a higher charge in the busy hour in order to help recoup network investment which is sized specifically for the busy hour.
7	Relevant	The capacity of the network elements reserved for voice calls are dimensioned around the busy hour which means that the time of day that a call is made is still relevant in NGNs
8	Relevant	Time of day charging has the benefit of encouraging the spread of traffic and reducing the busy hour. That said as a Mobile Operator we have removed the TOD element for wholesale charges. This is largely a reflection of the regulatory position and the risk of under recovery of costs.
9	Relevant	The capacity of the network elements reserved for voice calls are dimensioned around the busy hour which means that the time of day that a call is made is still relevant in NGNs
10	Some Relevance	Preference would be for a flat rate to mirror what is occurring in the retail market
11	Some Relevance	Whilst we accept that time of day has some relevance we question the degree. Voice will play a small part of the overall capacity within a network plus retail tariffs are tending to ignore TOD so wholesale price signals will not facilitate more efficient network use
12	Some Relevance	We see that this has relevance provided that it provides accurate signals to the market. We do not believe that there needs to be a link between retail and inter-operator charge frameworks as individual operators can assess the risk at a retail level of removing the TOD element to charging.
13	Some Relevance	But needs to be differentiated by network element. That is, different network elements may have different time of day profiles. Applying one average time of day profile overall will send the wrong signals. Also, price signal argument only works at retail level, and increasingly time of day is

		excluded from bundled minutes tariffs. Wholesalers do not control how much traffic they generate.
14	Relevant	Busy hour usage will continue to be a cost driver and a TOD gradient can still reflect correct wholesale price signals to use capacity efficiently. Wholesale charges should not be trying to second guess future retail price innovation. Wholesale pricing needs to reflect efficiently incurred costs.

Charge Factor

Duration

New or Existing factor?

Existing

Company	Relevance	Reasoning
1	Relevant	The length of time that capacity is reserved to carry voice traffic is still dependent upon the duration of the call.
2	Relevant	Duration remains a cost driver and pence per minute a suitable charging structure
3	Relevant	The conveyance-related part of usage-based charging should remain per-minute as at present (but with option of pence per minute, pence per call, or 2 part charging for NTS/PRS)
4	Relevant	Duration remains a cost driver and pence per minute a suitable charging structure
5	Relevant	Duration remains a key driver of cost
6	Relevant	If the bandwidth was dedicated to a single customer such as dedicated internet access then duration would not be relevant, but as bandwidth is shared then duration is important - you pay for what you use. Pence per minute or pence per capacity used would equally work.
7	Relevant	Unless the wholesale mechanism reflects retail charging then the wholesale market is carrying an unnecessary level of risk. Despite flat rate tariffs in the retail market they are still covered by "fair use" policies which require call duration to be captured. As such therefore the wholesale charge mechanism needs to retain ppm charging (with options for 2 part and pence per call)
8	Relevant	Although the proportion of costs to establish the call are higher than for PSTN we feel the length of time that capacity is reserved to carry voice traffic is still dependent upon the duration of the call. The call set up costs can be averaged over this.
9	Relevant	Duration remains a cost driver and pence per minute a suitable charging structure
10	Some Relevance	Question the longer term relevance as retail market tends towards flat rate
11	Some Relevance	
12	Relevant	This remains relevant
13	Relevant	Ratio of per call costs and per minute costs may be different for NGN, and therefore should be reflected in price, but there still are costs driven by call duration so this is a relevant factor.
14	Relevant	Duration will remain relevant for the foreseeable future. Pence per minute whilst not perfect as a unit of measurement still has many practical advantages e.g. existing billing system capabilities, widely understood etc.

Charge Factor

Number of Elements

New or Existing factor?

Existing

Company	Relevance	Reasoning
1	Relevant	If the underlying charging structure is to reflect the cost of underlying network elements (and therefore cost drivers) the network elements must be present in the charging structure. These elements are expected to be different to PSTN however consideration needs to be given to what these should be.
2	Relevant	It is important for industry as a whole that the charge framework fully reflects the network elements 21CN as this has the biggest impact on the market. In addition the charge framework methodology needs to maintain the links to BTs underlying costs elsewhere e.g.?
3	Relevant	The network elements used for the distance-related charges should reflect underlying network costs and incentivise efficient connectivity and routing. The elements are likely to reflect distance conveyed and number of metro nodes traversed, and possibly utilisation of call server resource. Sufficient tiers of distance-based charging should be retained to provide appropriate incentives/reward for network investment. We suggest reducing the current 5 tiers (DLE/ST/DTS/DTM/DTL) to 4 tiers.
4	Relevant	There are 3 elements to charging which need to be reflected in charging. These are whether the MSAN onto which the call terminates is in a rural area (where the underlying technology is SDH and distances generally longer) or urban (where the underling technology is DWDM and distances generally shorter). The third element is whether calls are delivered to the parent PoSI (Point of Service Interconnection) for or not. Calls which are not delivered to the parent PoSI call origination and termination should attract an additional charge to provide the appropriate economic incentive to route efficiently e.g. a buy or build option. That said it is anticipated that inter PoSI traffic will be a competitive market with no price regulation.
5	Relevant	It is important for industry as a whole that the charge framework fully reflects the network elements 21CN as this has the biggest impact on the market. In addition the charge framework methodology needs to maintain the links to the underlying elements of BT's network. It is dangerous to create a charging methodology which loses the link to the underlying network elements because (1) the transparency required to analyse BT's charges is lost and (2) it provides a distorted incentive on BT to over-recover costs (in an effort to make absolutely sure that it does not under-recover).
6	Relevant	Some data/circuit providers use "number of rings traffic has to be transported across" as a way of expressing distance based charging which does attempt to take account of the number of network elements the traffic has to travel across. Similarly in the transmission world although chassis and cards are always needed at the circuit end points, distance is denoted by the number of amplifier sites required along the route. Number of network elements is much more relevant than distance per se.

7	Relevant	We believe that element based charging should allow charges to reflect costs. We have not given full consideration to our preferred approach however we have concerns over the impact of an urban vs. rural approach. These are in part as to whether they truly reflect cost, on who/how the rural/urban classification is determined and also on whether geographic charging will be understood by consumers.
8	Relevant	Agree that costs are driven by elements used within the network however we will provide a more detailed response on this section.
9	Not relevant	As a point of principle distance and element based charging should not be relevant in an IP environment in addition to that we also feel it will become harder to manage and bill for given the nature of IP networks.
10	Relevant	There is no case for not accurately reflecting the underlying costs , however the methodology should not become overly complex
11	Relevant	Underlying costs should be accurately reflected between operators
12	Relevant	This is hugely relevant. The charge framework should reflect the underlying network elements (segments)
13	Relevant	Definitely relevant, the issue is the granularity of network elements adopted.
14	Relevant	Underlying cost drivers need to be understood. Sufficient granularity of detail is needed that is a reasonable compromise between accuracy on the one hand and complexity on the other. Over averaging could distort market signals and inhibit a strong competitive environment.

Charge Factor

Volume Discounts

New or Existing factor?

New

Company	Relevance	Reasoning
1	Relevant (but might be small)	We would ideally expect a charging structure that comprises both a fixed and variable element to reflect the economics of the size and direction of traffic to be exchanged between different carriers. This is relevant to the transmission.
2	Not Relevant	We have concerns that volume discounts may discriminate against smaller players and that BT Retail would get the largest discount
3	Not Relevant	We do not see a case for volume discounts to be introduced.
4	Neutral	In principle no objection to volume discounts should cost drivers be identified that would suggest that a volume discount would reflect these volume based cost savings. Concerns with volume discounts relate to (a) whether they may be deemed to discriminate against smaller players (b) that BT Retail would get the largest discount (c) that they do not create artificial arbitrage such that the overall volume of traffic remains constant but aggregated through a small number of transit operators
5	Neutral	There will be some economies of scale but we expect these to be realised only in the way that operators make use of fixed cost elements (e.g. their interconnect links) and not through any reduction in price per minute or per call.
6	Neutral	Points (a) and (b) in comment 4 are very relevant. Volume discounts need to be at a level to give smaller players some benefits from volume whilst not giving significant market power to bigger players. If volume discounts start too low then it effectively destroys the wholesale market place as new entrants can enter the market directly e.g. current IPStream pricing and investment allows a wholesale play but 21CN products with lower entry levels and no real volume discounts will adversely affect the wholesale DSL market.
7	Not Relevant	Whilst we have large existing volumes of voice traffic, Volume discounts are felt to be likely to restrict competition and disadvantage new entrants. We do feel however that where traffic is balanced that commercial arrangements should be more flexible between two operators.
8	Not Relevant	Whilst having a significant level with interconnects and traffic with BT we do not see a case for volume discounts to be introduced.
9	Not relevant	Would be difficult to manage and measure, also might be an inhibitor to smaller interconnect partners.
10	Not Relevant	Adds unnecessary complexity to the regulation
11	Not Relevant	
12	Not Relevant	This is not appropriate. The charging framework itself needs to reflect economies of scale and scope without the need to for a further discounting scheme.
13	Not relevant	Economies of scale will be apparent anyway if element based charging is adopted.
14	Neutral	Telecoms is a scale business, therefore size does matter. Wholesale charges need to properly reflect underlying costs. However, the ability of a CP to negotiate discounts is a function of the competitive and regulatory landscape.

Charge Factor

Rural/Urban

New or Existing factor?

New

Company	Relevance	Reasoning
1	Not Relevant	Existing PSTN regime offers no differentiation between urban and rural and we see no reason for it to exist in NGNs. A limited set of high level of Points of Service Interconnects may preclude any build/buy decision for interconnection to Tier 2 and Tier 3 MSANs in 21CN, which suggests that a rural/urban charging differentiator is not relevant to 21CN NGN.
2	Relevant	The issue deserves a more detailed investigation. We believe that the utilisation of the MSAN is a key determinant and as such would find it difficult to support a solution where the classification is not based upon our own network. Politically this solution may be problematic should the wholesale charges flow through into retail. In addition we have concerns that if adopted there might be further reclassification of rural such that remote areas bear increasingly higher charges.
3	Not Relevant	We see no obvious economic rationale from de-averaging charges for urban and rural origination/ termination, and anticipate that this could prove politically unpopular if differential wholesale charges flow through into differential retail charges ('digital divide').
4	Relevant	In the legacy network Call Origination and Termination were to and from 100s of local exchanges which means the distances were much shorter than in 21CN. There are significant cost differences in 21CN between Tier1, Tier2 and Tier3 MSANs, and between dense cells and non-dense cells. This needs to be reflected in the charging structure and reciprocity agreements at the wholesale level by differentiating between dense and non-dense cells.
5	Not Relevant	For call termination the operator has no choice other than to send the call to the network that the appropriate end user is hosted upon. There is no opportunity for them to change their behaviour depending upon whether the end user is in an Urban or Rural location. Therefore, any such structure would be further exaggerating the digital divide for little real benefit.
6	Not Relevant	This suits the large national players who have significant networks already in the ground. Although response 4 has valid points re cost differences between different tiers of MSAN and dense/non-dense cells, response 1 is absolutely on the ball re the limited number of high level interconnects precluding build/buy decisions.
7	Not Relevant	The existing PSTN regime offers no differentiation between urban and rural and we see no reason for it to exist in NGNs. Interconnect has been agreed at a limited number of high level interconnects which would preclude any build/buy decision for interconnection to potentially high cost rural areas.
8	Neutral	Whilst we agree that costs should reflect network elements we do not understand the issues and implication of a rural - urban application of this to draw any conclusions.
9	Not relevant	The existing PSTN regime offers no differentiation between urban and rural and we see no reason for it to exist in NGNs.

		Interconnect has been agreed at a limited number of high level interconnects which would preclude any build/buy decision for interconnection to potentially high cost rural areas.
10	Not Relevant	We do not support the proposition of differential geographic pricing
11	Not Relevant	We believe such an approach would bring additional and unnecessary complexity for the regulator and for operators. It also encourages new incentives to over recover cost in rural areas. In terms of call termination there would appear to be no opportunity to differentially route calls to minimise cost. At a retail level we have concerns that this would feed through to retail tariffs, that consumers would have no way of knowing whether a call was urban or rural. Finally would such a scheme have any USO implications?
12	Undecided	This needs fuller debate however we have concerns over a move towards geographic pricing and therefore lean towards national averaging of such charging.
13	Relevant	Certainly makes sense from a cost perspective. However, not necessarily desirable from a social perspective. This is really an issue for Ofcom to decide on since it raises questions around implicit -v- explicit USO funding.
14	Not relevant	Whilst in theory the higher expected costs of rural call termination / origination should be reflected in wholesale costs, practically build Vs buy decisions will mostly be not relevant in practice i.e. it will probably not be cost effective for a CP to build to such sites, although the actual definition of 'rural' could be important. Overall, such a charging distinction would probably add undue complexity to the adopted charging regime.

Charge Factor

Quality of Service

New or Existing factor?

New

Company	Relevance	Reasoning
1	Relevant	Only relevant if varied levels of QoS are made available in NGNs, and therefore some allowance needs to be made for QoS within the charging structure
2	Not Relevant	No voice applications are anticipated that require this
3	Not Relevant	We assume that “gold” quality will be provided between operators to support PSTN emulation and we are not aware of requirements for voice services requiring differential QoS at this time. The main issue will be how to check that this level of quality is being provided, and the commercial terms covering situations where it is not delivered.
4	Not relevant	This might have merits in the long term but in the short and medium term 21CN cannot support this , which therefore raises the question of whether incorporating it in the charging mechanism at this time is appropriate
5	Not Relevant yet	Not relevant for PSTN emulation or most of the currently planned implementations of voice over NGNs but it is possible that it will become relevant at some point in the future.
6	Relevant	This needs to be factored in if QoS is going to be the mechanism by which real-time traffic such as voice is provided over NGNs. If there is no differentiation given to real-time applications over non real-time then it is difficult to envisage how NGNs will effectively work. Currently voice over MPLS is differentiated through priority Class of Service which is generally charged as a premium to lower Classes of Service.
7	Not Relevant	We assume that “PSTN” quality will be provided between operators. We have no view of voice services requiring differential QoS
8	Not Relevant	We cannot see any requirement for differential QoS on voice services at this time
9	Not Relevant	We assume that “PSTN” quality will be provided between operators. We have no view of voice services requiring differential QoS
10	Not Relevant	
11	Not Relevant yet	QoS has no relevance in the short term but needs to be a longer term consideration
12	Not Relevant	We cannot see any requirement for differential QoS on voice services at this time
13	Not relevant	
14	Not relevant	For the purposes of wholesale charging we do not see a requirement for differential voice QoS charging. Other services in the future may benefit from such differentiation in order to send appropriate economic signals to the market place. For voice, it is essential that NGNs (fixed and mobile) adopt QoS standards that will deliver acceptable E2E QoS.

Charge Factor

Call Set Up

New or Existing factor?

Existing (for example NTS)

Company	Relevance	Reasoning
1	Relevant	Signalling and call set-up is likely to form a larger part of the cost base and should therefore be reflected within in

		the NGN charging structure. In addition, call set ups are part of the charging structure for NTS and should therefore be included.
2	Not Relevant	We feel that this adds a level of complexity without any clear requirement or benefit to apply any further than existing call types
3	Neutral	For PSTN emulation the costs of signalling and call set up, whilst significant, are sufficiently stable not to require a separate charge element. However, per-call charges are one of the charging options for NTS and this should be retained.
4	Neutral	For PSTN emulation the costs for signalling and call set up, whilst significant, are sufficiently stable to not require a separate charge element. However, one might consider doing this to provide a forward looking element to facilitate future charging of different codecs, bandwidth requirements, QoS etc and ensure future flexibility of the charge structure. This would be partially dependent on the complexity/cost of incorporating this within any systems development
5	Relevant	We expect the cost of bandwidth to fall much more significantly than the costs associated with the call set-up driven elements (e.g. signalling and call servers) and therefore call setup will account of a more significant proportion of the costs. Therefore, pricing structure that includes a call setup fee (for successful calls) will help ensure that charges are better matched to costs.
6	Neutral	Cost of call set up is not currently charged for standard calls and we do not charge for it in our NGN based voice product. Customers are used to the current regime.
7	Not Relevant	We feel that this adds a level of complexity without any clear requirement or benefit. Whilst incorporating this might allow future flexibility there is no evidence that it might be required. Only when Retail offers demand such capability should they be introduced at a wholesale level.
8	Not Relevant	Whilst higher than for PSTN we believe that the call set up costs can be averaged and included in the duration charge. This reflects what is occurring in the retail market.
9	Relevant	Call set-up is likely to form a larger part of the cost base for some types of call and should therefore be reflected within in the NGN charging structure for the relevant type of call.
10	Not Relevant	Feel that this adds a level of complexity without any clear requirement or benefit if applied beyond existing circumstances.
11	Neutral	
12	Not Relevant	As this is not currently an issue and as the functionality will exist (as per NTS) then this is not an issue which needs to be addressed at this time
13	Relevant	Some costs relate to number of calls and some to duration. Call set up charge should reflect all the non-duration related costs.
14	Relevant	We expect the cost of bandwidth to fall much more significantly than the costs associated with the call set-up driven elements (e.g. signalling and call servers) and therefore call setup will account of a more significant proportion of the costs. Therefore, pricing structure that includes a call setup fee (for successful calls) will help ensure that charges are better matched to costs

Charge Factor

Reciprocity

New or Existing factor?

Existing

Company	Relevance	Reasoning
1	Not Relevant to Charging Differentiators	This is an important issue but is not part of the charge framework itself. Exec needs to consider level of urgency and when they wish to address this. It might be worth suspending discussions until charge framework is nearer agreement
2	Relevant	Ofcom argues that reciprocity is a good thing because (1) it acts as an incentive for alternative fixed networks to become as cost-efficient as BT and (2) it is convenient because it means everyone's termination rates are calculated in the same manner (unlike mobile where everyone have their own termination rate). However, it is incorrect to assume that fixed networks would not have any incentive to reduce termination costs in the absence of reciprocity. On the contrary, fixed networks already have this incentive because (i) they terminate their own calls on their own networks and (ii) there is a commercial incentive to reduce networks costs overall for call origination and conveyance purposes, and this has a direct effect on termination costs as well. We have severe concerns over the impact of the existing reciprocity agreement with BT. Reciprocity is not a universal concept which is applied everywhere. There are examples in France, Germany and Belgium where other regulatory regimes have been tried and tested in order to find appropriate termination rates for fixed network operators. One interesting example is where a new entrant is allowed to charge the termination rate that the incumbent charged 5 years ago and use a sliding curve to align with the incumbent's rates over a certain number of years (so-called delayed reciprocity). Most recently this principle has been used by Comreg in Ireland. Reciprocity is outside of the charge framework discussions but should be continued in parallel via a suitable forum and should be borne in mind in any discussions around NGN conveyance charging.
3	Relevant	Reciprocity is not directly part of the charging structure but it is important that we consider it during our work on the structure.
4	Relevant	Reciprocity is outside of the charging structure itself and should be developed in parallel. The arrangements should be simple and logical to minimise regulatory involvement and cost. The detail will need to be aligned with the new charging structure.
5	Relevant	Reciprocity is not directly part of the charging structure but it is important that we consider it during our work on the structure. Clearly there are some potential aspects to the charging structure that would be very complicated to deal with on a reciprocal basis (e.g. urban/rural)
6	Not relevant	This is not part of the charging framework. Agree with response 1.
7	Relevant	Without reciprocity there is a danger that regulation could become burdensome however we have concerns about the existing scheme has operated. We do not see reciprocity as

		part of the charge framework but support review in parallel through the appropriate forum.
8	Not Relevant	This is not a mobile issue and should be taken outside of the charge framework.
9	Not relevant	This is an important issue but is not part of the charge framework itself. Exec needs to consider level of urgency and when they wish to address this. It might be worth suspending discussions until charge framework is nearer agreement
10	Not Relevant to Charging Differentiators	Issue but is not part of the charge framework itself
11		
12	Not Relevant	This is not an issue for the charge framework however it is an issue that needs to be addressed, especially greater symmetry across Mobile and Fixed.
13	Not relevant	This is a big issue which should be dealt with by Ofcom as a policy issue. It relates to industrial policy - how much and how does Ofcom want to encourage competition. Not something that industry should be deciding.
14	Not relevant	Not relevant to charging framework discussions

Charge Factor

Ported Numbers

New or Existing?

Existing

Company	Relevance	Reasoning
1	Not Relevant to Charging Differentiators	Porting arrangements overlap with UKPorting and NGNuk's role in establishing any principles needs to be co-ordinated with UKPorting as it affects legacy and NGN networks.
2		Operators who do not use the database and misroute traffic should be penalised, however we question whether this work should not form part of the UKPorting activity.
3	Relevant	Failure to use the central database should be disincentivised, e.g. by requiring the originating operator to pay the costs of onward routing
4	Relevant	Agree with the statement of 3 however questioned how this might be achieved in practice.
5	Relevant	We need to consider Porting as part of a discussion with UKPorting
6		Clarification required. This is a secondary point and should be managed outside the rate discussion.
7	Relevant	Operators who do not use the database and misroute traffic should be penalised, however we question whether this work should not form part of the UKPorting activity. As part of this work the practical issues of invoice reconciliation needs to be considered.
8		Operators who do not use the database and misroute traffic should be penalised, however we question whether this work should not form part of the UKPorting activity.
9	Not relevant	We are not convinced that this will be either measurable or enforceable.
10		
11	Relevant	Operators who do not use the database and misroute traffic should be penalised, however we question whether this work should not form part of the UKPorting activity.
12	Relevant	The incentive to use the CDB information needs to exist however we feel that as other mechanisms exist (such as the ability to charge transit cost) it need not be addressed in the charge framework
13	Not relevant	Should be decided by UKPorting
14	Not relevant	Not relevant to the current scope of establishing charging principles for voice services today. However, this issue will need to be dealt with probably through UKPorting