INTERCONNECT COMMUNICATIONS

Ofcom
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Report

Investigating the feasibility, costs and development time scales associated with various potential enhancements to BT's billing capability for Number Translation Services (NTS)

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INTERCONNECT COMMUNICATIONS
A Telcordia Technologies Company

Report to

Ofcom

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Contents

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1 Executive Summary

The Number Translation Services (NTS) framework and associated formula are used by the industry to manage the complex system of payments between BT and operators when originating, terminating and transiting calls to NTS operator number ranges.

Ofcom has commissioned a study, the objective of which is to determine the feasibility of several development options to BT's billing capability to support NTS, including their likely cost, timescales and risk factors. In particular, Ofcom is interested in the impact of introducing finer tariffing granularity for numbers in the 084x, 087x and 09x ranges, as well as the impact of adopting originator-specific payments rather than a standard retention for operators that originate calls to NTS ranges.

Ofcom is considering the future of the link between retail prices for calls originating on the BT network to the 0845 and 0870 number ranges and the level of numbering granularity at which all NTS number ranges are associated with retail prices. Currently the whole of the 0845 and 0870 ranges have one price point each, whereas other number ranges such as 0844 are tariffed differently at the 100,000 and 1,000 number block (for internet-only ranges) levels.

Ofcom is interested in the impact on operators' billing systems of increased tariffing granularity. The possibilities under investigation are illustrated in the following table:

	100k	10k	1k	Individual
0844	Currently[1]	√	√	√
0845	√	√	√	√
0870	√	√	√	√
0871	Currently[1]	√	√	√
09	Currently	√	√	√

Following Ofcom's statement on retail pricing arrangements for 0845/0870 numbers in April 2004, tariffing granularity on the 0844 range has already been extended to:

- 10k blocks for number blocks allocated by Ofcom to Communications Providers (CPs) in 10k blocks;
- 1k blocks for the internet-only number blocks allocated by Ofcom to CPs in 1k blocks.

As a result of the increased granularity of tariffs, both the retail and interconnect billing systems are likely to be affected through the recording of a larger number of price points, which will need ongoing maintenance as operators introduce new rates and update existing ones.

A proposal for originating operator-specific payments has been made by some originating operators, and the billing system impacts of this are also examined as part of this project. At a high level this would mean that terminating payments would be calculated not only with respect to the deemed retail price for the call (of which there could be many different versions due to finer granularity) but also that each payment would differ according to the network on which the call originated. The impact of originator-specific payments on

[1] It is recognised that some 0844 and 0871 ranges are currently allocated and priced at the 1k level.

operators' billing systems has, therefore, also been investigated as part of the study, though not the estimation of the costs associated with its implementation.

In order to determine the impact to the billing systems as a result of the introduction of finer tariffing granularity and originating operator specific payments, InterConnect has interviewed BT and a selection of other operators. It is recognised that the greatest impact of the introduction of these proposals falls on BT's systems due to BT's position as an originator, terminator and transit operator and its associated role in the cascade billing process. However, these proposals also affect other operators, whose networks variously originate and terminate 087x, 084x and 09x calls.

The interviews with BT indicate that the introduction of finer tariffing granularity would require some development to BT's billing capability, both retail and wholesale. Whilst BT has not investigated in detail the scale of the impact and no formal feasibility study has been carried out, high level investigations made in the course of this review seem to indicate that many systems could be modified to allow the introduction of finer granularity, predominately with only simple or moderate development changes. If, on further investigation during a feasibility study, it is found that more complex changes are required to implement finer granularity, the cost of development and timescales for implementation may increase. The billing developments likely to be required are estimated to take up to a year to complete once underway. Ongoing administration and data maintenance costs have also been taken into account.

As a result of the introduction of finer tariffing granularity, other operators would also need to modify their retail and interconnect billing systems to manage more price points. These operators tend to use predominately off-the-shelf systems where development to implement finer tariffing granularity would be performed by the vendor. In many cases, however, changes would also be required to bespoke in-house systems for analysis and reporting, incurring additional cost by the operator. Estimates of the costs and timescales for developments to other operator billing systems do not form part of this study.

Changes to the NTS regime to allow for finer tariffing granularity and originator-specific payments will have an impact on the billing systems of both BT and other operators in the industry. Within the timescales of the study, neither BT nor the other operators were able to quantify in detail all of the systems that would be affected nor the scale of the impact with regard to cost or timescale for billing development. As a result, InterConnect has estimated the potential cost of modifications to the most important of BT's billing systems. InterConnect acknowledges that no detailed feasibility study has been carried out and therefore the estimate made in this report is only used to give an indication to Ofcom of the likely scale of the costs of billing developments in order to implement finer tariffing granularity. The estimation model uses information from BT and assumptions on the elapsed days and man-days required for simple, moderate and complex system developments. Assumptions were made on the level of parallel and consecutive development and testing for both BT Retail and BT Wholesale billing developments in order to determine an elapsed time period for the total billing development.

The outcome of the estimation model shows the following one-off and ongoing costs both for BT Retail and BT Wholesale billing systems, with the lower number being considered to be the more likely estimate. The higher number might be incurred if most available price point combinations were used, thereby requiring more complex system changes and greater levels of re-coding for performance considerations.

	BT Retail	BT Wholesale	Total
One Off Development Cost	From £268k to £542k	From £373k to £565k	From £641k to £1107k
Ongoing Annual Cost	Approx £39k	Approx £39k	Approx £78k

Process issues surrounding price point data maintenance were raised with some valid concerns about data and billing accuracy. Price lists will require more frequent updating with associated impacts both on BT and the other operators (particularly in the case of the carrier price list).

The scale of process impact is dependent on the number of price points finally implemented by BT and other operators. Assuming that finer tariffing granularity is introduced in the future, at any of the proposed levels, the take up of it by operators remains an unknown at this stage. Many operators do not change their retail tariffs more than once or twice a year, but new tariffs may be introduced at other times (as new service providers join operators or as competition increases for the hosting of NTS numbers). Equally, not all operators make their tariff changes at the same time of year.

The issue of originator-specific charges has been more difficult to resolve. No clear implementation methodology has been defined within the industry and BT is unable to suggest a mechanism to identify the originating operator for all call scenarios without the industry undertaking co-ordinated and significant signalling developments. As such, BT considers both a robust implementation of originator-specific payment and the billing capability to support it to be non-feasible at this time. Without the ability to identify the originating operator for all call scenarios (including CPS & IA), for which these detailed signalling developments are required, InterConnect considers that the implementation of originator-specific payments is impossible.

The successful implementation of finer tariffing granularity essentially rests with the question of the public's view of pricing for NTS services. Would the introduction of more pricing levels further confuse the public or allow greater flexibility in service provision that could benefit the consumer? These issues will, no doubt, be addressed by Ofcom and the industry in the course of the ongoing NTS Framework Re-examination.

2 Introduction

Number Translation Services (NTS) numbers are numbers identified in the Plan[2] ('the Plan') as Special Services Numbers (broadly speaking, numbers that start with 08 or 09[3]).

The NTS framework and associated formula are used by the industry to manage the complex system of payments between BT and operators when originating, terminating and transiting calls to NTS number ranges.

NTS is one of the regulatory areas where Ofcom undertakes considerable work, including the management of disputes, which are regularly referred to the regulator for resolution. On a tactical level, Ofcom has recently reviewed the retail pricing arrangements for the 0845 and 0870 number ranges and has also consulted on changes to the NTS interconnection billing arrangements[4]. Growing consumer and Industry concerns about the operation of the current regime have prompted Ofcom to undertake a strategic review of its policy on NTS – a project known as the NTS Framework Re-examination. As a result, Ofcom hopes to be able to address these concerns and to reduce the amount of regulatory involvement in NTS.

Towards this end, Ofcom has commissioned a study the objective of which is to determine the feasibility of several development options to BT's billing capability, including their likely cost, timescales and risk factors. In particular, Ofcom is interested in the impact of introducing finer tariffing granularity for numbers in the 084x, 087x and 09x ranges, as well as the impact of adopting originator-specific payments rather than a standard retention for operators that originate calls to NTS ranges.

InterConnect Communications Ltd (InterConnect) has been commissioned by Ofcom to undertake this study, in the course of which it has interviewed BT and four other network operators. Any commercially sensitive information provided by the operators is used in the report in a manner not attributable to any specific operator. To maintain confidentiality, the four operators have not been identified in the main body of the report, which will be published by Ofcom. Confidential information has been provided to Ofcom in separate, clearly marked annexes, which will not be published by Ofcom.

The findings of this study will feed into to a consultation issued by Ofcom as part of the NTS Framework Re-examination.

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[2] The Plan is a document that Ofcom is required to publish under Section 56 of the Communications Act 2003 setting out the telephone numbers made available for allocation by Ofcom.

[3] NTS also includes the legacy 05 Freephone number ranges which, whilst still in use, are not listed in the plan as they are no longer available for new allocations. Within the 08 range, numbers in the 0844 04 range are used for Surftime Internet access services and numbers in the 0808 99 range are used for FRIACO and are not included in the NTS definition.

[4] Relevant tactical reviews include *Calls to 0845 and 0870 Numbers: Review of Retail Pricing and Numbering Arrangements* of September 2003, Subsequent Statement issued April 2004 and *INCA/CLI for NTS Interconnection Charging* of December 2003, Subsequent Statement Issued July 2004.

3 Background to the Project

This section describes the key issues surrounding the project.

3.1 Relevant NTS Issues

According to the Numbering Plan, the BT retail prices for the 0845 and 0870 number ranges are currently linked to BT's 'standard' local and national call charges. The introduction of call plans and other discount schemes by BT and other operators has meant that charges for calls to 0845 and 0870 ranges are rarely, if ever, the same as those that consumers typically pay for geographic local and national calls. The rates for calls to 0845 and 0870 ranges are generally higher than those for their geographic "counterparts", whilst such calls are also generally excluded from discount packages which have unlimited or flat rate charges for local and national calls. Such a state of affairs leads to customer confusion on the actual charges for calls to these number ranges, exactly the opposite of one of the intentions to link the number ranges to an identifiable rate in the first place.

In addition to the confusion over the rates charged for calls to these number ranges, there is increasing public awareness of the situation whereby the terminating operator and service provider to whom they are calling share between them the revenue associated with the calls. In these days of automated response systems and queuing to get through to the service provider, users are beginning to feel that they are being charged substantially to receive the service from the provider.

The above points describe the retail issues surrounding calls to 084x and 087x ranges. The NTS formula used to calculate the amounts due to interconnecting operators is complex and a regular source of dispute between operators, who often refer these disputes to Ofcom. As a result of these interconnection charge issues and the retail charge confusion, amongst other things, Ofcom has initiated an NTS Framework Re-examination programme.

3.2 The NTS Formula

The NTS formula has been developed to calculate the payments between BT and operators who are variously originating, transiting and terminating calls to NTS number ranges. The formula does not include detail of any payments made between the terminating operator and the service provider whose NTS service it is hosting. These are subject to commercial agreements, as are originating and terminating payments for NTS calls between non-dominant Communications Providers (CPs) when calls do not transit the BT network.

The NTS formula is:

The Originating operator retains P – D + C
The Terminating operator receives D – C

Where:

- P is the actual retail price charged by the originating operator to the customer, ex-VAT (including uplift for BT minimum call fee);
- D is the deemed retail price for the call, including any allowance for discounts and bad debt (in the case of Premium services);
- C is the pence per minute charge for conveyance over a tandem segment of BT's network plus an uplift to allow for retail costs incurred by the originating operator in handling these calls. The BT NTS Call Origination Condition requires that C is cost-based.

This formula becomes more complex when the elements which make up each of the three factors are included.

The terminating operator receives D – C where:

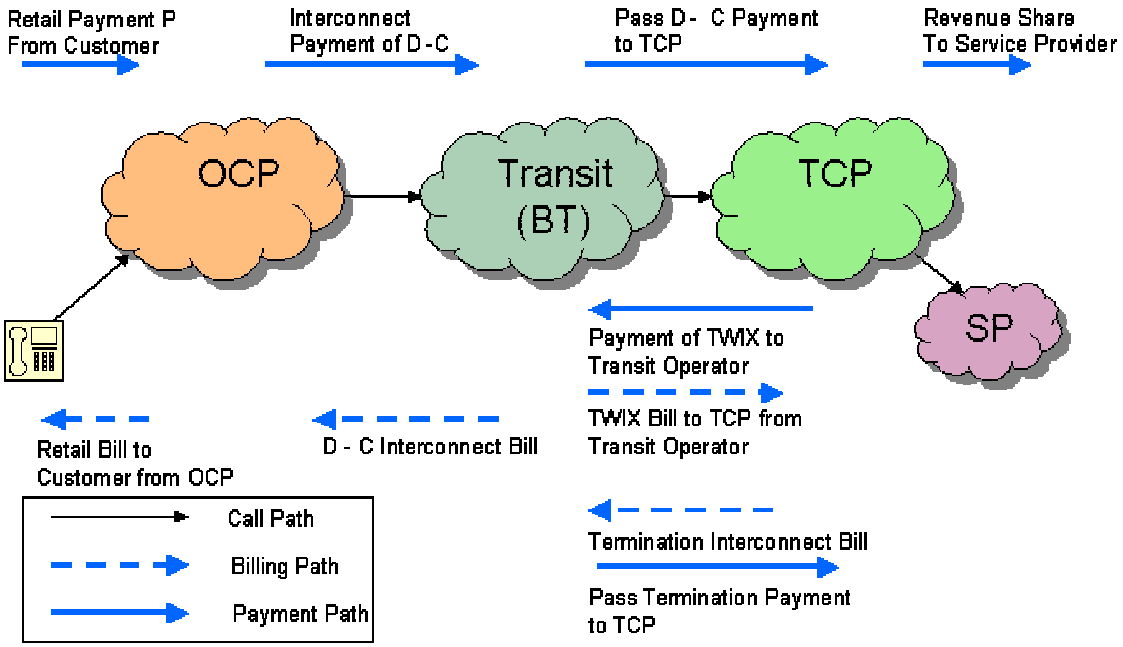
- D = P * (1 – Discount Percentage);
- C = (Single Tandem Call Origination * NCD Factor) + Retail Uplift.

Therefore it can be seen that the amount the terminating operator receives is dependent upon:

- The retail price of the call type (P);
- The discount percentage applied to the retail price;
- The charge for a Single Tandem Call Origination segment;
- The Network Charge Differential (NCD) factor (not used by all operators and planned to be replaced by a CLI-based solution by December 2005);
- The Retail Uplift.

As the TCP pays the Service Provider (SP) from the amount it receives to terminate these calls, the level of all these variables is crucial to the amount of revenue made by both service provider and terminating operator.

Cascade billing is used to distribute the call revenue between the interconnected parties - the Originating Communications Provider (OCP), the Terminating Communication Provider (TCP) and any transit provider. In the following example, BT is acting as the transit party between the OCP and TCP which are not directly interconnected:



TWIX is the payment made to BT for their transit leg between the OCP and TCP. This is billed to the TCP separately from the payment of D-C has been made. For most NTS call types the TWIX payment is made by the TCP, but for the 0844/0871 number ranges it is paid by the OCP.

BT could also either be the originating or terminating party in which case it would either keep the retention, C, and pay D-C to the TCP or receive D-C itself from the OCP, respectively.

3.3 Finer Tariffing Granularity

As part of the re-examination, Ofcom is considering the future of the link between retail prices for calls originating on the BT network to the 0845 and 0870 number ranges and the level of numbering granularity at which all NTS number ranges are associated with retail prices. Currently the whole of 0845 and 0870 ranges have one price point each, whereas other number ranges such as 0844 are tariffed differently at the 100,000 and 1,000 number block (for internet-only ranges) levels. Ranges in the 09x range can already have many different price points, ranging from fixed prices per call to an upper limit of £1.50 per minute.

In this project, Ofcom is interested in the impact on operators' billing systems of increased tariffing granularity. The possibilities under investigation are shown in the table below.

	100k	10k	1k	Individual Number
0844	Currently	√	√	√
0845	√	√	√	√
0870	√	√	√	√
0871	Currently	√	√	√
09	Currently	√	√	√

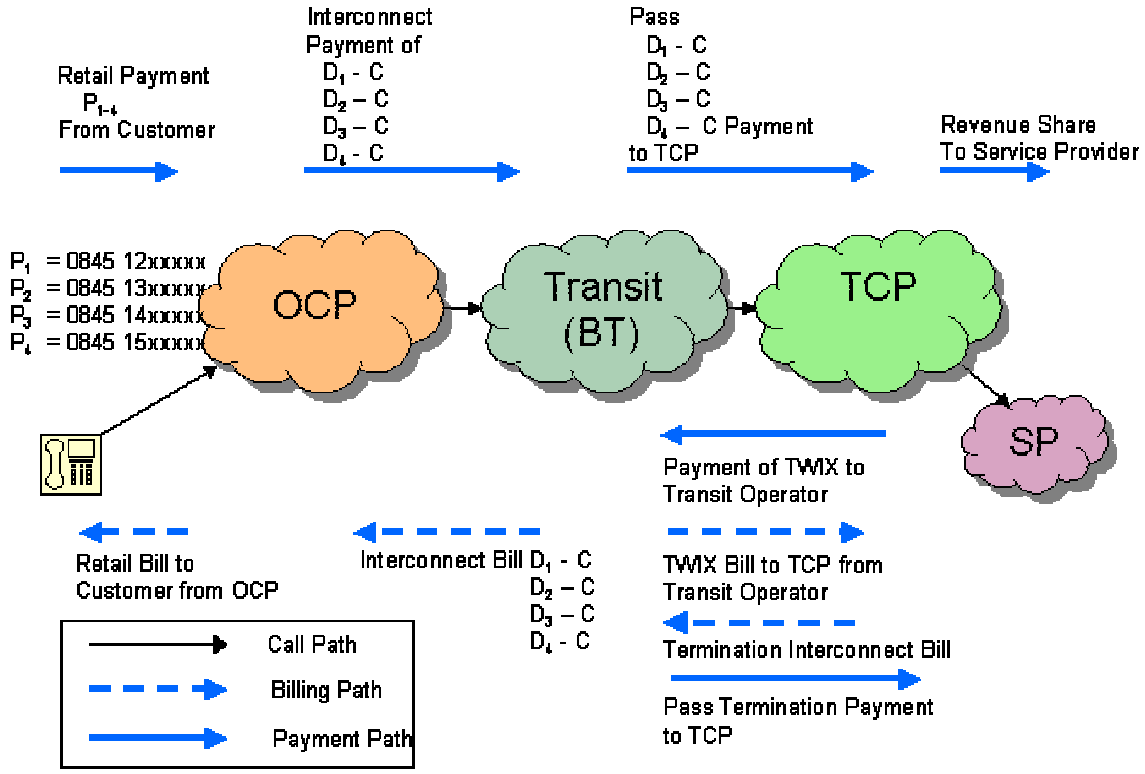
Following Ofcom's statement on retail pricing arrangements for 0845/0870 numbers in April 2004 tariffing granularity on the 0844 range was extended to:

- 10k blocks for number blocks allocated by Ofcom to CPs in 10k blocks;
- 1k blocks for internet-only number blocks allocated by Ofcom to CPs in 1k blocks.

Tariffing granularity for the 0871, 0845 and 0870 remains unchanged. However, a full investigation into the billing impact of tariffing granularity down to individual number level is a prudent way of covering all options as part of one study. At present, tariffing occurs in larger blocks than those used to allocate numbers to CPs by Ofcom. This prevents TCPs from changing prices without changing the number because other CPs will still be using that price point within that allocated range.

Reducing the size of the number block used to set the tariff to the same size as that in which the number block is allocated gives the CP control of the price point for the range it has been allocated. Reducing the granularity further enables the CP to use the number block more flexibly by subdividing it into particular tariffs. OCPs can choose how to tariff calls from their networks to those number ranges. For example, some CPs may choose to have only a few price points of their own and price higher than the TCP's nominated price point. According to the NTS formula, the terminating operator receives D-C and the

increased granularity of retail prices will correspond to an increased granularity of values of D.



As a result of the increased granularity of tariffs, both the retail and interconnect billing systems are likely to be affected through the recording of a larger number of price points, which will need ongoing maintenance as operators introduce new rates and update existing rates. Retail billing systems will need to bill customers making calls to NTS numbers at new price points, and the interconnect billing systems will need to generate and reconcile invoices for inter-operator payments disaggregated at a lower level due to more numerous values of D. The impact on the billing systems for both BT and other operators is assessed as part of this project. The impact is likely to be greatest for BT as it originates, transits and terminates a large proportion of the NTS traffic.

3.4 Originating Operator-Specific Payments

According to the NTS formula described above, the amount paid to the terminating operator is D-C, where C represents the retention that the originating operator keeps for originating the call. At present, for calls transited by BT this retention is the same for all operators, and is based on BT's single tandem call origination cost, the NCD factor and retail uplift, effectively using BT's call origination costs as a proxy for other CP's call origination costs.

Some originating operators, however, claim that their costs are greater than those of BT, and are therefore lobbying to receive a value for C based upon their own costs. As these OCPs are not bound by the BT NTS Call Origination Condition to have cost-oriented charges for C, they would also like to earn a higher margin on their origination charge. If C were to be increased within the current NTS formula, the terminating operator would

receive less for terminating the call. If the terminating operator was to receive the same amount as when using BT's C, then the originating operator would need to increase its retail price for NTS calls to achieve a higher retention. Originating operators are reluctant to do this because it would make calls from their networks more expensive than calls originated from BT's network and, therefore, less competitive.

A proposal for originating operator-specific payments to terminating operators has been made by some originating operators, and the billing system impacts of this are also examined as part of this study. At a high level, this would mean that terminating payments would be calculated not only with respect to the deemed retail price for the call (of which there could be many different prices due to finer granularity as described in the section above) but also that each payment would differ according to the network on which the calls originated. This would add another dimension to an already complicated billing situation. This is particularly true for NTS calls transiting BT's network, which account for a high proportion of total NTS traffic. Currently BT's interconnect billing system cannot identify calls which originate on some other networks. Over the course of the next year the proposed INCA/CLI development will address this problem at an aggregate level by the provision of additional reports enabling TCPs to identify transit calls that are otherwise incorrectly identified on the basis of their CLI.

Originating Operator	Retail Price	Originating Retention	Terminating Operator Receives
OCP 1	P_1 0845 12xxxxx	C_1	$D_1 - C_1$
	P_2 0845 13xxxxx	C_1	$D_2 - C_1$
	P_3 0845 14xxxxx	C_1	$D_3 - C_1$
	P_4 0845 15xxxxx	C_1	$D_4 - C_1$
OCP 2	P_1 0845 12xxxxx	C_2	$D_1 - C_2$
	P_2 0845 13xxxxx	C_2	$D_2 - C_2$
	P_3 0845 14xxxxx	C_2	$D_3 - C_2$
	P_4 0845 15xxxxx	C_2	$D_4 - C_2$
OCP 3	P_1 0845 12xxxxx	C_3	$D_1 - C_3$
	P_2 0845 13xxxxx	C_3	$D_2 - C_3$
	P_3 0845 14xxxxx	C_3	$D_3 - C_3$
	P_4 0845 15xxxxx	C_3	$D_4 - C_3$

As a result of the originating operator setting its own C, the terminating operator receives differing amounts of call revenue depending on the originating operator. The above table shows the impact on the billing relationships of a relatively straightforward scenario where each OCP has only one specific value of C. OCPs, however, would also like to have different commercial agreements with different terminating operators, implying a different value of C for each combination of originating and terminating operator. These arrangements increase the number of values of C significantly and will have an effect on the number of invoices sent and the complexity of their reconciliation between interconnected operators. Originator-specific payments would increase the tariffing table sizes by orders of magnitude and, therefore, a cascade billing solution would be difficult to implement.

A commercial solution for the introduction of originating operator-specific payments has yet to be agreed within the industry. Not surprisingly, the terminating operators are unwilling to accept anything that would reduce the amount of revenue they receive for NTS calls. If the cascade billing situation currently in use for NTS proves too complicated to manage these specific payments, then direct accounting between originator and terminating operator for the difference between the BT retention and the originating

operator's retention has been proposed. This, however, relies on agreement between the originator and terminator, which may not be forthcoming given the opposing commercial interests of originating and terminating communications providers.

4 Method Of Working

In order to determine the impact to the billing systems as a result of the introduction of finer tariffing granularity and originating operator specific payments, InterConnect interviewed BT and a selection of other operators. It is recognised that the greatest impact of the introduction of these proposals is on BT's systems due to BT's position as an originator, terminator and transit operator and its associated role in the cascade billing process. However, these proposals also affect other operators, whose networks variously originate and terminate 087x, 084x and 09x calls. Accordingly, four other operators were selected for interview. These operators were chosen as they represent a cross section of operators who are active in the industry, each with a slightly different focus on the NTS issue:

- A mobile operator;
- A major net originator of NTS traffic;
- A major net terminator of NTS traffic;
- A major carrier pre-selection CP.

Questionnaires were developed containing high level questions regarding the operator's current billing systems (both retail and interconnect) and the perceived impact on these systems (in terms of feasibility, cost and timescales) of the introduction of finer tariffing granularity and originating operator specific payments. The questionnaires (a copy of which is attached at Annex A) were sent to the operators in advance of the meetings where the issues raised as a result of the questions were discussed.

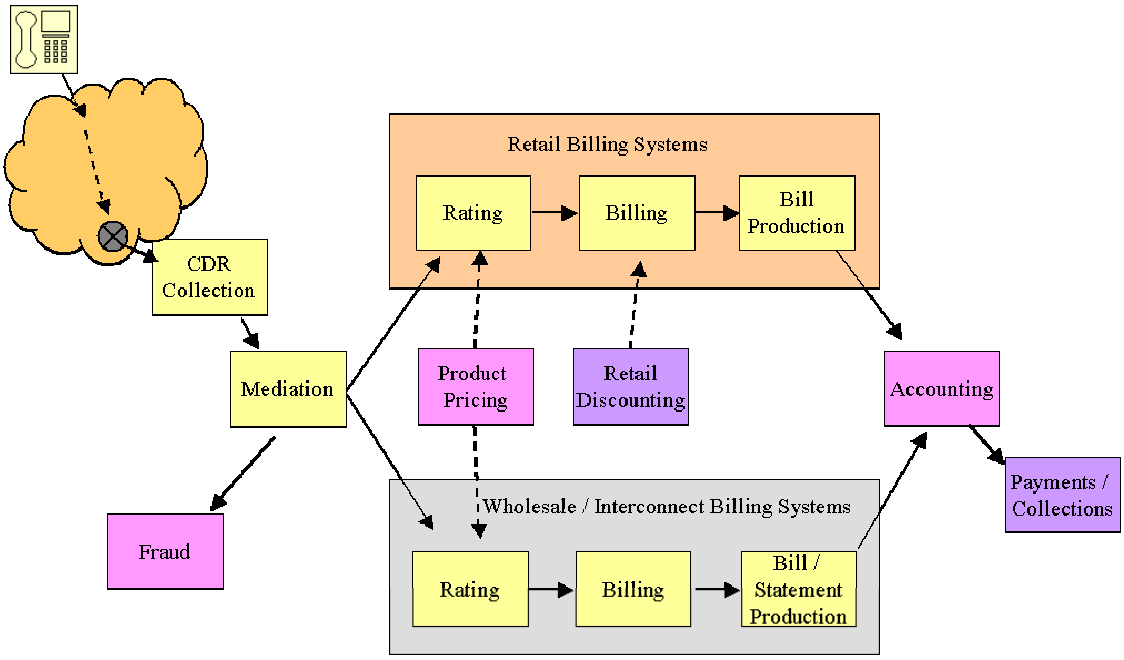
Meetings were set up with each of the four operators and BT, which were held at their premises during August 2004. The issues raised in these discussions are described in Sections 5 and 6.

In order to estimate the cost and timescales associated with the introduction of finer tariffing granularity, InterConnect developed a cost and timescale model using both information from BT and assumptions on the elapsed days and man days required for simple, moderate and complex system developments. Assumptions were made on the level of parallel and consecutive development and testing for both BT Retail and Wholesale billing developments in order to determine an elapsed time period for the total billing development. More detail on the estimation methodology and the assumptions used is given in Sections 5.1.3 and 5.1.4.

The discussions with the other operators were used to assess their perception of the impact of finer tariffing granularity and originator-specific payments (if appropriate) on their billing systems. As each operator has a slightly different focus on the NTS regime, their combined view of the impact on their systems was used to make a high level industry-wide assessment of the introduction of finer tariffing granularity and originator-specific payments. A cost estimate of the impact on each operator's billing systems was outside the scope of this study.

5 BT's Billing Capability

BT's billing capability follows the generic billing sequence of Mediation - Rating - Billing – Bill Production, as illustrated below. Additional systems are attached for the application of discounts and data warehousing for fraud and nuisance numbers, providing call and financial data to the business and to Ofcom and for intra-BT transfer charging. Whilst this section addresses the issues at a generic level, the impact estimates established by InterConnect are based on specific systems information provided in confidence by BT.



Generalised Flow of the Billing Process

Billing developments are undertaken separately for both BT Retail and BT Wholesale billing systems, and do not normally need to be co-ordinated. Developments to the Product Pricing database (which holds the number range to price point relationship information) would entail some communication between retail and wholesale as both billing systems use this database. Implementation dates for retail and wholesale systems developments would only be matched when a new modification was required which affected both systems.

5.1 Perceived Impact of Proposed Scenarios

The questionnaires supplied to BT requested detailed information on the characteristics of systems - both retail and wholesale – that were likely to be affected by finer tariffing granularity and originator-specific payments. BT was unable to provide such detail as it considered that a formal feasibility study would be required, and that timescales in which the information was required precluded any such study from being undertaken. As such, any information on impacted systems was given at a high level. BT could not guarantee that other systems would not be impacted in addition to those discussed or that those

highlighted might not be found to be more severely impacted during a formal feasibility study.

Where the suite of billing programs includes off-the-shelf systems or components, there may be an issue arising from increased software licence fees. Some off-the-shelf systems incur licence fees payable to the vendor which may be based on the number of subscribers and/or the number of call records processed. As the number or records increases the licence fee will also increase, but not necessarily in a linear fashion as banding of fees may apply when the number of records processed passes a certain threshold. InterConnect has not been able to assess the likely impact of such volume-based fees without detailed analysis of BT's commercial agreements with the system vendors. However, there may come a point at which the long-term consideration of increased licence costs may indicate that a redevelopment of system components could become economically viable.

InterConnect has, therefore, documented the perceived high level impact of the introduction of finer tariffing granularity and originator specific payments in the Sections below, and recognises that a detailed investigation of the impact on BT's billing capability has not been carried out by BT in order to provide responses to InterConnect's questions. InterConnect has developed a cost estimate for retail and wholesale billing developments, using assumptions regarding the level of modification to the most significant retail and wholesale systems and using InterConnect's experience of retail and wholesale billing. The estimates also incorporate man-day rate information at different resource levels provided in confidence by BT. InterConnect recognises that additional unforeseen costs may arise during a detailed feasibility study which may be conducted at a later stage. However, the estimates developed as part of this study have been shown to knowledgeable representatives of BT retail and wholesale billing systems for verification, and their comments have been incorporated into the final estimate figures.

The following Sections describe BT's high level view of the technical and process impact on BT's retail and wholesale billing capability[5] of the introduction of finer tariffing granularity and originator specific payments. Estimated cost and timescale impacts developed by InterConnect on the billing systems are also detailed, together with all assumptions made.

5.1.1 Technical Impact

5.1.1.1 Retail Billing Systems

BT considered that many of the systems involved in retail billing would be impacted as a result of the introduction of finer tariffing granularity, including systems which hold the number range to price information, perform call rating, implement discounts and handle bill presentation. Service-specific billing such as that for Featurenet may also be affected but costs for any developments related to these have not been included in the cost estimate detailed in this report.

The impacts on the Product Pricing Database and call rating engine were thought to be manageable for increased granularity, with few significant technical difficulties at least until tariffing at individual number level was implemented. Cost may be incurred in

[5] The impact on many areas of BT's systems, including billing, of the introduction of the 21st Century Network in 2006 is still under consideration within BT

additional disk storage space, but creating larger tables to handle more price points was on the whole considered technically possible.

BT perceived that the system most affected would be the Retail Discounting system which calculates bulk discounts and the Bill/Statement Production module. The Retail Discounting system contains bulk discount information, calling circle (Friends & Family) details and call category and volume thresholds (call allowances). It also identifies discounts according to the first few digits of a number range. It is understood that discounts can only be calculated according to number ranges identified to a maximum of 7 digits, thereby restricted to a 10k number block. Tariffing at 1k or individual number level would, therefore, require a substantial change to be made to this system. The level of significance of the change has not been detailed by BT, but is assumed to be at least a moderate change.

BT considers that the Bill/Statement Production module would also be affected by a move to finer tariffing granularity if the detail was required to be shown on customer bills. Several systems are involved in bill presentation, both for residential and large business customers. BT provides One Bill services to large corporates, which include charges for different services provided on one bill. BT considers there to be an impact on these systems but has not quantified the detail.

Systems used for the billing and settlement of BT-managed NTS service providers are also likely to be impacted by a move to finer granularity. These systems take CDR information directly from mediation systems and are separate to those shown in the billing systems diagram. This impact will be felt in producing and managing the longer reports required from these systems when accounting for traffic with billing service providers.

Many of the systems related to billing capability, including both the discounts and bill presentation systems, interface with the CSS system. CSS is a BT legacy system, which is very large and considered particularly difficult to change or replace due to age, extensive functionality and a history of modifications, as well as having a complex internal data management structure.

The charging of calls to NTS numbers from some payphones may also be impacted. Older payphones which use meter pulses can handle only up to 63 price points. This number has already been passed with current services, and price points have to be shared by choosing one price closest to the charge required. The potential increase in price points under investigation in this study could have a significant effect on call charging from these older payphones. However, given that this issue only affects the older payphones, and taking into consideration the limited expected number of NTS calls that would be made from such payphones, the overall impact of this limitation is expected to be small. The current system of using the closest existing price point of the 63 could be continued.

5.1.1.2 Wholesale Billing Systems

BT has two main elements to its interconnect billing system, INCA and GenIUS. GenIUS is made up of three off-the-shelf systems, with some bespoke additions.

Overall, no significant technical issues were raised with regard to the impact of the introduction of finer tariffing granularity. INCA produces aggregate call summaries which are then rated, rather than rating on a call-by-call basis. INCA uses the same number range/ price point database as the retail billing system, and therefore any change to that system would be shared by both retail and wholesale. Since 1999, the number of price

points in this database used for NTS calls has risen by around 50% to currently approach 7,000. Therefore, as with the retail billing systems, the issue of creating larger tables to hold further price points was not seen as presenting an immediate technical limitation.

The processing time to produce the aggregate call summary report, however, was highlighted as one potential impact area within the interconnect billing suite. As the number of price points increases, it was considered that the likelihood of approaching some internal performance constraints would increase, to a point where the system or its platform might not be able to process the workload within the time available for each bill cycle. BT considered that Azure would be unable to say at what level of granularity or number of price points that a code rewrite would be required to increase the performance of INCA to an acceptable level. Batch processors have been used to increase performance, but known limitations with the scaling of these processors suggest that performance issues are still likely to arise at some stage.

GenIUS includes off-the-shelf systems from three different vendors. Some off-the-shelf systems incur licence fees based on the number of subscribers and/or the number of call records processed. InterConnect has not been able to assess the likely impact of such volume-based fees without detailed analysis of BT's commercial agreements with the system vendors. In the case of BT Wholesale billing, the number of records processed are those in aggregate call summaries and will depend on the level of tariff granularity implemented. If tariffing granularity was implemented at 1,000 number blocks or individual numbers, the increased cost of volume-based licence fees could be significant.

5.1.2 Process Impact

BT expressed concern on the impact that increased tariffing granularity would have on the management of increased price point information within both retail and wholesale billing systems. A larger number of price points requires more resource for the data to be input manually into systems, increasing the possibility of error. BT's billing operations department is concerned that the increased number of price points would bring with it an increased number of billing queries with which they would have to deal, again implying an increase in operational resources.

Both retail and wholesale price lists would need to be changed to show an increased number of tariffs for calls to NTS number ranges. In the case of the wholesale carrier price list at least, updates are made manually into a spreadsheet. A larger number of price points, particularly at individual number level, would make such data entry more onerous than it is currently. The carrier price list is already a large and cumbersome entity, the management of which proves difficult for many smaller operators in updating their billing and reconciliation systems to reflect BT's wholesale prices. Similar changes would be required to BT's retail pricing manual and online call charge calculators. BT also expressed concern about the frequency of the introduction or modification of price points by operators. For example, if changes were allowed at any time, this would have a more significant impact on resources than if changes and additions were only allowed, say, once at the beginning of each month.

5.1.3 Cost Estimates of BT Billing Development

InterConnect has prepared two development cost estimates that are presented in Annex C, maintained as confidential because it contains information from BT that was authorised for use only in this context. It is not made generally available in the main published part of this report.

The modifications to BT's billing systems required to support finer tariffing granularity are categorised into simple, moderate and complex changes with the following broad definitions:

Simple	The type of change that adds a table or two to a system without significant redesign such as a column or two to a report, adds columns to a table or one that changes a sort sequence or system parameters. A Simple change (in both cost and time) is indicated even where a system has only to be checked to see if a code change is needed, since this requires a level of expertise and resource use. Even the simplest change should include a level of testing to ensure that system integrity is maintained.
Moderate	This type of change includes adding a new group of tables or subject area to a database, revising data relationship structures, changes to program algorithms or logic, changing database navigation paths, interdependencies between or interfaces with other systems. If the change involves a redesign of interfaces with other systems, then a Moderate change can easily escalate to become Complex.
Complex	This type of change is indicated for outsourced groups of programs, major BSS/OSS core systems (such as Billing), systems with complex data management mechanisms or extensive interlinked data structures. It also tends to apply to legacy systems, those based on older technology platforms, to systems that already have a history of change or where there are few IT specialists available who are familiar with the programs.

The table below presents an overview of the systems affected and the extent of changes to program logic, reference data table structures and content to accommodate finer granularity in NTS pricing. This table is in summary form and deals with modifications at the generic level. In general, apart from mediation, all of the major systems related to retail and wholesale billing are affected to some degree.

Generic System	**Retail**	**Wholesale**
Mediation	No Change *(see note)*	
Pricing	Simple *(see note)*	
Rating	Simple	Simple
Discounting	Moderate	Moderate
Billing	Complex	Complex
Bill Production	Simple	Simple
Reporting	Simple	Simple
Note: *These systems serve both Retail and Wholesale / Interconnect Billing, so changes are common to both processes. Other systems shown are separate for Retail and Wholesale.*		

As the number of table entries increases, there is an increasing likelihood that program constraints are revealed. Also, even if the pricing granularity were increased, there is a chance that not all the possible price points will be actually used. Consequently, the point at which a Simple change becomes Complex one due to a need for internal re-design or restructure is indeterminate. At the same time, hardware storage or system processor configurations may be simply scalable, but only up to a point, at which a migration to another platform might be required. Where such factors have been identified to InterConnect (or are reasonably suspected), they have been taken into account. The cost impact of a redesign to manage the performance limitations in INCA, for example, has been included in the estimate, but the cost of additional hardware which may also be

required to support increased performance has not. The cost of this additional hardware may be in excess of £100,000.

The InterConnect estimates have not included the cost of additional hardware or data storage devices, since these depend at least on the number of new NTS price points, the number of calls made to individual NTS numbers within each number block and, on the available spare capacity, as to when or whether additional hardware might be needed. In the time available for the study, this information could not reasonably be determined. The resultant costs, however, are likely to be relatively small in comparison with the cost of the system developments.

As a general statement, it can be expected that, as increasingly finer granularity increases the number of price points and the number of database table entries, the additional reporting lines on retail and wholesale bills as well as on interconnect statements will result in an increase in the number of the aggregation totals that form the basis of invoicing and reconciliation between BT and OLOs for interconnection traffic. This may in turn increase the storage and processing time required. Hence it is reasonable to expect that there will be a compounding effect in that a number of small changes will progressively constitute a larger impact.

Adding a few new price points would normally be expected to have a trivial impact that would be easily absorbed into existing daily operational workloads and system capacities. As the granularity increases with new pricing available at 10k, suggesting price points at a moderate level of increased detail, and taking into account the tendency of operators to offer NTS numbers at prices clustered around a few price points, the impact is considered likely to be around that shown in Estimate 1.

Expanding the number of price points up to every available NTS number in every block would almost certainly increase the impact to the extent presented in Estimate 2. This estimate reflects in the increased complexity of billing developments, demonstrated in more man days and more qualified (and hence expensive) resources being required. In addition to the cost shown in Estimate 2 there would be some hardware required that cannot be easily assessed without an extensively detailed feasibility study.

By assuming that change management employs a conventional system development lifecycle, and based on resource cost information provided by BT, InterConnect has estimated the cost of change at three different levels, as shown in the table below. The values necessarily have to be in a range until a feasibility study is undertaken for each affected system, bearing in mind that even to perform such a study can itself incur the cost of the time of quite senior expert resources.

Extent of Change	Range	Cost Assumed (approx)
Simple	From £12k to £15k	£13k
Moderate	From £45k to £60k	£50k
Complex	From £120k to over £300k	£150k (Estimate 1) £280K (Estimate 2)

An additional operational cost has been assessed at requiring one extra Administrator Full-Time Equivalent (FTE) at the standard fully-allocated cost, for each of Retail and Wholesale billing operations, to enter and update the additional price points data. InterConnect understands that these are separate operational areas within BT. Some overlap with other roles is of course possible, which may reduce this attributable cost.

These ongoing administration costs have been assumed to be approximately £39,000 per annum each for both BT Retail and BT Wholesale.

The model revealed the following cost estimates:

	Retail Billing Systems	Wholesale Billing Systems	Total
One Off Cost			
Estimate 1	£268k	£373k	£641k
Estimate 2	£542k	£565k	£1107k
Ongoing Cost			
Estimates 1 & 2	£39k pa	£39 k pa	£68k pa

5.1.4 Timescales

The man-day effort and assigned FTE figures used in the estimate model are taken from practical experience in the context of a busy IT development environment, where a formal change management and development management process is followed. The nature of the activities concerned and the scale of the figures used were reviewed with informed BT personnel and agreed to be reasonable in the uncertain context that is being evaluated in this report.

Any estimate of timescales has to take into account current planned and scheduled workloads, particularly for systems that are affected by these changes. The change management and development teams are separate for Retail and Wholesale / Interconnect Billing, so some degree of overlap has been taken into account during assessment of the duration of development and testing. The preliminary evaluation/ specification and later rollout activities are assumed to be serial.

- Estimate 1 indicates 178 elapsed working days (from actual start point) – about 9 months.
- Estimate 2 indicates 262 elapsed working days – about 13 months.

5.2 Originator-Specific Payments

The most important element to identify in the concept of originator-specific payments is the originating operator, in order for its own retention to be charged within the NTS formula. In InterConnect's opinion, no straightforward mechanism exists to identify the originating operator except the calling line identity (CLI) of the originating (calling) customer. In many cases this identification would be sufficient for BT where the caller's originating network was directly connected to that of BT for terminating or transit and provided that the caller had not ported in its telephone number from another network and provided that CPS or IA are not used when originating the call.

However, not all originating operators send NTS calls to BT for transit or termination directly. Some choose to send calls via another transit network due to the CPSOs being hosted on the other operator's network. As a result, the network sending the call to BT may not be the originating network.

The method used to overcome these problems for the INCA/CLI development is to subtract outgoing NTS traffic from incoming traffic at an aggregate level taking no account of the network originating or sending the call, only that its intention is to transit BT's

network for onward termination on another network. Hence the INCA/CLI solution is not suitable for originator-specific payments.

The impact of number portability means that the CLI itself, even though it is carried between operators, will not identify the originating operator in situations where the caller has ported their number from another operator. Analysis of the CLI will identify the donor network, rather than the network which originated the call. As a result, the CLI alone cannot be used to identify the calling network in all cases.

The scale of number portability is an important factor in assessing how likely this misidentification would be. Figures published in the recent Mason report[6] to Ofcom on the subject of number portability suggest that 5% of lines have been ported up to the end of 2003 and growth in porting is likely to be around the EU average of 1.4% per annum. BT, however, felt that those customers who port their numbers could be those who make more calls than those who do not, and therefore the proportion of calls from ported numbers may be greater than the equivalent proportion of ported numbers themselves.

A system of hybrid-direct accounting between the originating, transiting and terminating operators is one which could be used to implement originator-specific payments with no change to BT's current billing capability, as BT would continue to bill based on the standard retention, the originating operator sending an invoice for the difference between the standard and its own retention to the terminating operator directly. As a result no costing of BT's billing developments for this solution would be required as no changes to its capability are necessary. Originating operators would need to have agreements in place with each terminating operator to cover the payment of the difference in retention due to them.

A form of originator-specific payments using this hybrid direct methodology is currently under discussion between Kingston and BT for the latter's terminating NTS traffic, whereby Kingston will have its own retention but claim the difference between the standard retention and its own directly from the terminating operator. BT will also provide a report indicating where calls did not terminate on BT's network due to the porting out of numbers to other operators. Identification of calls from Kingston is somewhat easier than the general case due to their limited geographical location. However this system has yet to be finalised, let alone introduced, and the ability of Kingston to secure agreements between themselves and terminating operators is still to be tested in practice.

Another option cited by originating operators for the implementation of originator-specific payments is the introduction by BT of a TWIX-only product for NTS calls. This would allow the originating and terminating operators to settle directly with each other and BT would calculate and charge the TWIX transit payment as implemented in the upcoming INCA/CLI developments. Therefore, this option would also involve no new billing development for BT but, like the hybrid direct option, the feasibility of its implementation depends on the ability of the originator and terminator to enter into direct accounting agreements for this traffic.

It is understood that the industry has extensively discussed the ability to identify the originating operator as part of the INCA/CLI billing developments. The only solution found to clearly identify the originating operator was the development of an originator flag within the call signalling, which would need to be unalterable and pass through all

[6] In support of Ofcom document *An assessment of Alternative Solutions for UK Number Portability* of August 2004.

operators handling the call. It was considered by the industry, under the auspices of the NICC, that this development would be both time-consuming and costly taking into consideration the reason for which it was required. As a result, this solution was not investigated further for INCA/CLI.

In order for BT as transit provider to support originator-specific payments in a cascade billing context and for it to work accurately and efficiently, inter-operator signalling developments would be required to carry an originating operator identification throughout the call. Without the ability to identify the originating operator for all call scenarios (including CPS & IA), for which these detailed signalling developments are required, InterConnect considers that the implementation of originator-specific payments is impossible. The costing of the technical and billing developments required to support originator specific payments is outside the scope of this study.

5.3 Discussion

The introduction of finer tariffing granularity would require some development to BT's billing capability, both retail and wholesale. Whilst BT has not investigated in detail the scale of the impact and no formal feasibility study has been carried out, high level investigations made in the course of this review seem to indicate that many systems could be modified to allow the introduction of finer granularity, predominately with only simple or moderate development changes. If, on further investigation, it is found that more complex changes to systems are required to implement finer granularity the cost of development will undoubtedly increase. The billing developments likely to be required are estimated to take up to a year to complete once underway. Ongoing administration and data maintenance costs have also been taken into account.

The issue of originator-specific charges has been more difficult to resolve. No clear implementation methodology has been defined within the industry and BT is unable to suggest a mechanism to identify the originating operator for all call scenarios without the industry undertaking significant signalling developments. As such, BT considers both a robust implementation of originator-specific payment and the billing capability to support it non-feasible at this time. Without the ability to identify the originating operator for all call scenarios (including CPS & IA), for which these detailed signalling developments are required, InterConnect considers that the implementation of originator-specific payments is impossible.

6 Impact on Other Operators' Billing Systems

InterConnect interviewed four other operators as part of the study, who were asked about their current NTS billing capability and the impact on this of the proposed introduction of finer tariffing granularity and originator specific payments. This section discusses the perceived impact of Ofcom's proposals on the operators' systems.

6.1 Perceived Impact of Proposed Scenarios

6.1.1 Technical Impact

All four operators believed there to be little technical impact of the proposals for finer tariffing granularity on their retail billing systems. Increasing table sizes to manage a larger number of price points should cause no technical problems. They considered that there might be some throughput or processing impact relating to the production of reports, but that this was unlikely to be significant.

The perceived impact on interconnect billing systems was more varied between the operators. Operators A, B and C use third party developed billing systems, each with the same current supplier but with a different history. Operator C considered that changes would be required to its rating and coding engines in addition to the impact on table and field sizes within the systems. They expressed concern that the cost of such developments could be significant and would attract competition for funding internally because its business case was perceived as potentially offering limited return. Operators A and B considered there to be no technical issues with regard to interconnect billing except throughput of report processing.

Operator C suggested that there would also be an impact on the systems of resellers who receive aggregate bill information and then in turn need to produce bills for their own customers.

None of the operators was in a position to estimate costs and timescales for any required billing developments as part of the finer tariffing granularity proposals.

All four operators were asked their opinion on the subject of originator-specific payments for NTS traffic. Operator D, although a net originator of traffic, did not consider that its introduction would have any impact on its operations. Operator B was interested in originator-specific payments but stated that, even though its billing system did not currently have the technical capability to handle it, it did not consider the developments to be unduly difficult. It stated that simplifications of the carrier price list as a result of the INCA/CLI changes would free-up space within the price list to cover the increased complexity related to originator-specific payments. The resulting carrier price list might, therefore, be not significantly larger than at present.

6.1.2 Process Impact

All operators believed there would be some impact on the operational resources required to maintain the increased volume of tariffing information by their retail billing teams. This may require additional personnel or the allocation of more time to this task from existing personnel. Without detailed information on the scale of the additional tariff granularity it

was impossible for the operators to quantify the level of additional resource and its associated cost.

Operators A and B stated that they envisaged data maintenance resource impacts similar to that in the retail billing systems with regard to the entry of price points into their wholesale billing systems. Operator B stated that aggregate reports used for interconnect billing and reconciliation would be longer, increasing the time required to both produce and analyse these reports. Operators A and C were concerned about increased resources for management of changes to BT's carrier price list.

Operators A and C were also concerned that the introduction of originator-specific payments would have an impact on their management of the carrier price list, already considered to be a time consuming process.

6.2 Discussion

As a result of the introduction of finer tariffing granularity, other operators would need to modify their retail and interconnect billing systems to manage more price points. Some operators might choose not to change their retail tariffs to these numbers if they didn't feel under competitive pressure to do so.

However, changes to interconnect billing systems would be required to invoice other operators and reconcile invoices received. Reports from the interconnect billing systems which are used for reconciliation would be larger and perhaps take longer to produce if system performance was affected by the increased number of price points.

Other operators tend to use predominately off-the shelf-systems, development of which to implement finer tariffing granularity would be performed by the vendor. If several operators' systems were from the same vendor, development costs may be shared to some degree therefore reducing the cost impact on the individual operators. However, the level of the bespoke nature of any modifications to such systems would affect the level of any such savings. In addition, in many cases other changes would also be required to bespoke in-house systems for analysis and reporting, incurring additional cost to the operator.

Settlements to service providers should not be affected by the change in tariffing granularity as any reductions or increases in total NTS tariffs as a result of its introduction would show a reduced amount of revenue share paid to that operator. Reports within billing and settlement presentation could be longer as a result, which may require modifications to systems which produce account statements for service providers.

7 Conclusions

Changes to the NTS regime to allow finer tariffing granularity and originator-specific payments will undoubtedly have impacts on the billing systems of both BT and other operators in the industry.

Having interviewed BT and a sample of operators, InterConnect has highlighted in this report the impacts considered likely in the event of finer tariffing granularity. Within the timescales of the study, neither BT nor the other operators were able to quantify in detail all the systems which would be affected nor the scale of the impact with regard to cost or timescale for billing development. As a result, InterConnect has estimated the potential cost of modifications to the most important of BT's billing systems as well as the elapsed timescale for such changes to be carried out. In addition, InterConnect has estimated the ongoing process related costs associated with the management of a greater number of NTS price points. InterConnect acknowledges that no detailed feasibility study has been carried out and therefore the estimate made in this report is only used to give an indication to Ofcom of the likely scale of the costs of billing developments in order to implement finer tariffing granularity.

The outcome of the estimation process performed by InterConnect shows the following one-off and ongoing costs both for BT Retail and BT Wholesale billing systems, with the lower number being considered to be the more likely estimate. The higher number might be incurred if most available price point combinations were used, thereby requiring more complex system changes and greater levels of re-coding for performance considerations.

	BT Retail	BT Wholesale	Total
One-Off Development Cost	From £268k to £542k	From £373k to £565k	From £641k to £1107k
Ongoing Annual Cost	Approx £39k	Approx £39k	Approx £78k

The introduction of finer tariffing granularity would introduce only limited technical issues for both retail and wholesale billing systems, with the exception of a bulk discount management system for retail billing, which may require a significant redesign. More concern surrounded possible longer processing times and associated performance considerations. As the number of price points increases it is likely that capacity or performance limits will become more apparent. On the basis of the information provided by the operators interviewed as part of the study, InterConnect concludes that the introduction of finer tariffing granularity is feasible with varying levels of billing development required, particularly for opt-in/opt-out of discounts below 10k number blocks and possible performance limitations at individual number level.

Process issues surrounding price point data maintenance were raised with some valid concerns about data and billing accuracy, which may in some cases potentially jeopardise certification of billing accuracy by extending the number of rows in database tables and thereby increasing the opportunity for errors. Price lists will require more frequent updating with associated impacts both on BT and the other operators (particularly in the case of the carrier price list).

The scale of process impact is dependent on the number of price points finally implemented by BT and other operators. If finer tariffing granularity is introduced in the future, at any of the proposed levels, the likely take-up of it by operators remains an unknown at this stage in the investigation. In addition there may be "clustering" of

number blocks around particular price points, as is currently the case with 09x adult services that cluster at the £1.50 per minute charge. The eventual number of discrete price points may not be as large as currently envisaged, but the flexibility of the number of charge points which tariff granularity brings could be of value to service providers.

The implementation of new price points also affects the process impact on operators. Many operators do not change their retail tariffs more than once or twice a year, but new tariffs may be introduced at other times (as new service providers join operators or as competition increases for the hosting of NTS numbers) and not all tariff changes are made at the same time of year by all operators. The burden of additional price points within billing systems and corresponding updates to price lists is likely to be particularly heavy on BT, although the scale of their resources to manage such changes is considerably greater than smaller operators.

The impacts of the introduction of finer granularity are likely to affect all players in the market. Some operators, such as mobile operators, may choose not to apply retail price changes, but all operators who interconnect for the transit or termination of NTS traffic are likely to be affected by increased report sizes taking additional time and resources for invoicing and reconciliation.

The feasibility and costs associated with modifications to billing systems to support originator-specific payments were included in the study as discussion has been ongoing into their introduction within the industry. However, it became clear during the study that the business model for the implementation of originator-specific payments was far from defined and therefore supporting billing system modifications would be impossible to determine until an agreed solution was found in the industry. Problems surrounding the ability to identify the originating operator in cases of transit and those calling customers with ported-in numbers have yet to be solved. Signalling solutions discussed by the industry are deemed to be very costly and time consuming to implement, and are seen as being a somewhat lower priority than other planned or proposed changes. As a result, billing system modifications to support originator-specific payments are considered to be non-feasible at the present time. InterConnect has, therefore, highlighted the issues raised to them on the subject by BT and other operators during this study, but has not estimated costs or timescales for any development.

The successful implementation of finer tariffing granularity essentially rests with the question of the public's view of pricing for NTS services. Would the introduction of more pricing levels further confuse the public or allow more flexibility in service provision which could benefit the consumer? During the course of the study, some operators mentioned the use of recorded announcements detailing the price of the call, but this itself raises issues of who provides this announcement, who pays for it, what should it say, and so on. These issues will no doubt be addressed by Ofcom and the industry in the ongoing NTS Framework Re-examination.

ANNEX A

Operator Questionnaires

Questions for OLOs

How do you manage the billing and reconciliation of calls to or from 084x, 087x and 09x ranges, for

- Your retail end customer
- Your hosted service provider
- Interconnection charges (origination, termination and transit)?

Include details of the various systems used, whether bespoke, package, in house developed, outsourced etc.

How do you envisage these systems to be affected if the pricing levels of the 084x, 087x and 09x ranges are set at a finer level of granularity, as follows:

	100k	10k	1k	Individual
0844	Currently	√	√	√
0845	√	√	√	√
0870	√	√	√	√
0871	Currently	√	√	√
09	Currently	√	√	√

Do you consider the changes to your systems to be feasible for some or all of the scenarios shown above? What is the likely cost impact of each of the scenarios? What timescales do you consider would be required to implement system changes for the scenarios?

How do you envisage the introduction of this finer granularity to affect your systems business processes and operational overheads? What is likely to be the cost impact of these changes?

What effect do you consider the introduction of the proposed finer granularity pricing to have on the routing and/or network management of calls to 084x, 087x and 09x ranges?

What is your view on the introduction of originating operator specific payments for calls to 084x, 087x and 09x ranges?

What would be the impact, if any, of the introduction of originating operator specific payments on your billing systems and processes? What is likely to be the cost impact of these changes?

Questions for BT

How do you manage the billing and reconciliation of calls to or from 084x, 087x and 09x ranges, for

- Your retail end customers
- Your hosted service providers
- Interconnection charges (origination, termination and transit)?

Include details of the systems used, whether bespoke, package, in house developed, outsourced etc.

How do you envisage these systems to be affected if the pricing levels of the 084x, 087x and 09x ranges are set at a finer level of granularity, as follows:

	100k	10k	1k	Individual
0844	Currently	√	√	√
0845	√	√	√	√
0870	√	√	√	√
0871	Currently	√	√	√
09	Currently	√	√	√

Do you consider the changes to your systems to be feasible for some or all of the scenarios shown above? What is the likely cost impact of each of the scenarios? What timescales do you consider would be required to implement system changes for the scenarios?

How do you envisage the introduction of this finer granularity to affect your systems business processes and operational overheads? What is likely to be the cost impact of these changes and the timescales for any new processes to be introduced?

What effect do you consider the introduction of the proposed finer granularity pricing to have on the routing and/or network management of calls to 084x, 087x and 09x ranges?

What is your view on the introduction of originating operator specific payments for calls to 084x, 087x and 09x ranges?

What would be the impact, if any, of the introduction of originating operator specific payments on your billing systems and processes? What is likely to be the cost impact of these changes?

If changes to INCA are required to support the changes suggested by Ofcom, does BT envisage being able to recover some of the cost of the developments from other companies also using INCA?

Further Billing Development Questions for BT

Ofcom wishes to understand the scale (including costs and timescales) of the billing development within BT's systems of the introduction of finer tariffing granularity for each of the new scenarios shown below.

	100k	10k	1k	Individual
0844	Currently	√	√	√
0845	√	√	√	√
0870	√	√	√	√
0871	Currently	√	√	√
09	Currently	√	√	√

1 List programs affected (needing code change) by introduction of each of the new finer tariffing granularity scenarios shown above.
2 List programs affected (needing reference data or table changes)
3 List interfaces / data exchange media / data entry screens affected

For each affected program:

4 Define outline architecture
5 State nature of change
6 State complexity of change

Overall approach

7 Which if any standard SDLC or development method does BT / Exact / Azure (as applicable) use?
8 How is this modified for changes?

9 How many people are expected to be involved in each stage, for how long (man days) and overall (elapsed days)?

10 What are the assumed daily rates for persons involved with different skills?

11 What contingency might be added, if any?

12 When could this work start?

If possible please provide the number of man days and elapsed days for the following activities

Business specification
Feasibility study and assessment
Detailed design
Review
Development
Testing
Training
Rollout
Management