IN THE COMPETITION APPEAL TRIBUNAL

Case Nos. 1245/3/3/16

Victoria House,
Bloomsbury Place,
London WC1A 2EB

20 May 2016

Before:

HERIOT CURRIE QC
(Chairman)
PROFESSOR GAVIN REID
BRIAN LANDERS

(Sitting as a Tribunal in England and Wales)

BETWEEN:

BRITISH TELECOMMUNICATIONS PLC Applicant

- and -

OFFICE OF COMMUNICATIONS Respondent

- and -

GAMMA TELECOM HOLDINGS LIMITED
CP GROUP Interveners

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DAY THREE

A P P E A R AN C E S

Mr. Robert Palmer & Ms Fiona Banks (instructed by BT Legal) appeared on behalf of the Applicant.

Mr. Josh Holmes & Mr. Tristan Jones (instructed by Ofcom Legal) appeared on behalf of the Respondent.

Mr. Tim Johnston & Sarah Love (instructed by Charles Russell Speechlys) appeared on behalf of Gamma Telcom Holdings Limited.

Mr. Alan Bates (instructed by Towerhouse LLP) appeared on behalf of CP Group.

Friday, 20th May 2016

(10.30 am)

MR KEVIN YOUNG (continued)

THE CHAIRMAN: Good morning Mr Bates.

MR BATES: Good morning sir. Having reflected last night and having looked at the transcript, it seems to me that the questions I was going to put to Mr Young have been sufficiently covered with Mr Morden and therefore I do not need to put any questions to him.

THE CHAIRMAN: Very well. Ms Love, before you start there was a point I wanted to raise with Mr Holmes. Mr Holmes, in your cross-examination of Mr Morden you took him through the routes that a non-ported call, a ported call and then a ported again call might take.

MR HOLMES: Yes.

THE CHAIRMAN: And the Tribunal found that very helpful. We wondered if you could direct us to any of the diagrams in the case where that evidence could be illustrated, or if not whether you, or even better in agreement with other parties, could have somebody prepare a very simple diagram showing these routes so we can compare them.

MR HOLMES: I am sure that can be arranged sir. There are a number of diagrams already and I suspect from amongst those diagrams the best can be culled almost certainly by agreement.

We can also direct you to where in Ofcom's previous discussion and assessment of porting there is the discussion of the unported numbers which was one of the points

that I raised, if that would be helpful to the Tribunal, yes.

THE CHAIRMAN: Thank you; Ms Love?

MS LOVE: Sir, I had not intended to ask anything of Mr Young and in view of the transcript I am unchanged in that view.

THE CHAIRMAN: Mr Palmer, do you wish to re-examine?

MR PALMER: I do not, sir.

THE CHAIRMAN: Thank you very much for your evidence, Mr Young.

(The witness withdrew)

MR HOLMES: I think we then come to BT's witness, sorry Ofcom's witness. That is Mr Steven Perry if I could call him, please.

MR STEVEN PERRY (affirmed)

Examination-in-chief by MR HOLMES

MR HOLMES: Mr Perry, I hope that you have in front of you a bundle marked DF1.

A. I have a bundle for witnesses' core documents, yes.

Q. If you could turn within that bundle to tab 2, you will see there a witness statement and if you could turn to the back, is this your witness evidence in these proceedings?

A. Yes, it is.

Q. If you could turn to the final page, is that your signature?

A. This copy isn't signed.

Q. There is, I hope, in other -- it's because it's the non-confidential version, but you have signed a copy of this?

A. Yes.

Q. And returning to the front there is a brief summary of your experience, and just to run through that -- it's uncontentious -- but you are employed now by Ofcom but from 1991 to 1995 you were indeed with BT?

A. Yes.

Q. In its core network planning department?

A. Yes, that is correct.

Q. And then for five years following that with AT&T?

A. Yes.

Q. Planning and dimensioning their voice networks, including interconnection with BT and others. And from 2000 to 2002 and then again from 2004 to 2006 you worked for Global Crossing, where you developed and managed both TDM and NGN networks, and network-based interconnection services for CPs?

A. Yes, that is correct.

Q. And by training you are an engineer?

A. Yes.

Q. I am grateful. If you could wait where you are there will now be some questions. I am so sorry, yes I have been reminded, I did have one question arising from the transcript yesterday. You were present in court yesterday?

A. Yes.

Q. Did you hear a question that Professor Reid raised with Mr Morden as to the tasks involved in implementing interconnection, whether physical or electronic, electromechanical?

A. Yes I did.

Q. Would you like to provide your view on what is involved in implementing

interconnection in terms of the tasks involved?

A. Yes, certainly. I suppose a good place to start is trying to unpick a little bit the different elements of an interconnection circuit. So the first thing is, as has been set out in the evidence, the optical fibre that connects the BT building to the CP building, and that's a high-capacity link that is called the In Span Interconnect. And at each end there's a piece of equipment that breaks that circuit, that In Span Interconnect into its component 2 megabit per second circuits of which there would typically be 63 on each of those fibres.

Now, at that point you do not have a connection between the two networks in terms of voice traffic, you just have the physical interconnection in place. So then --

THE CHAIRMAN: So just pausing there you have got a box at either end and a fibre cable in between?

A. That is correct. To then provide the interconnect circuit between the exchanges in the two networks, you will provide individual 2 megabit per second connections from that box to the exchange. That would be at the BT end and the CP end, those circuits would need to be provided, and that then provides the connection end-to-end between the two switches or exchanges. And obviously you will put in as many as you think you need for the traffic.

So at that point you then have the connection in place but at that point it doesn't -- it's still not usable for the traffic, what you need to do is tell the network what it is and how it can be used. So if you imagine that you put in -- you decide you need 10 of these 2 megabit per second interconnect circuits between the two switches, that would equate to 300 individual voice channels because there's 30 voice channels on each 2 megabit per second circuit. And each CP at either end,

BT at one end and the CP at the other end, need to put data into their network which says I have got a circuit with 300 voice channels going to this other communications provider's switch, the particular switch that you are connected to, and also instruct the network what traffic you can send on that link. And at that point then that link is in service and can be used and traffic is flowing over it.

THE CHAIRMAN: So we can visualise this, can you give us a feel for how far apart the BT building and the CP's building typically might be, or does it just depend entirely on the circumstances?

A. It depends on the circumstances. Obviously in major cities they might be close together, but BT's got more buildings than CPs, so there might be quite a distance in those cases.

THE CHAIRMAN: I think we have heard some evidence about how many buildings BT has, which gives us a feel for how many buildings a CP might have, or again does that depend entirely on the circumstances?

A. It would depend on the circumstances, but obviously the CPs are here and they can probably answer that question better than I can.

THE CHAIRMAN: Thank you, sorry I interrupted you.

A. That is fine.

So then Mr Morden talked about if a CP wants to rearrange a circuit, so if that's -- the situation I have just laid out was an interconnection to a BT tandem. If I wanted to rearrange a circuit to a DLE, I would unplug the circuit and plug it back into the DLE and the CP doesn't need to do any physical work.

I agree that the CP would not do physical work in that circumstance, but what does need to happen is, I need to take the traffic off that circuit I am going to move and

I need to tell the switches that that original connection no longer has 300 channels but has been reduced by the 30 channels that I am going to move. Then, once BT's physically moved it, I then need to tell the switches at the end again that I have a connection to the DLE of one circuit with 30 channels, and then point the traffic to it.

The alternative is if I can't rearrange one of those circuits because it's full of traffic and I need to provide a new one, then obviously what needs to happen is again BT will connect the next free 2 megabit circuit on that ISI link into its DLE and the CP will connect that same circuit at its end into its switching equipment. And then you provide the data again to say there are 30 circuits and you connect it together.

So at both ends of the circuit there's electronic data that needs to be put into the network, certainly at BT's end there are connections that need to be provided and cables that need to be moved around. Whether that needs to happen at the CP end will depend on whether it's arrangement of a new circuit and also the specific technology and equipment that they have used. As newer developments have come along, that process has become more automated. So it may be that they can do that through software as well, but that would obviously depend on the specific equipment that the CP is using at the time. Clearly, if you add a new circuit you end up with more circuits being used than you would have previously, and you would be paying a rental to BT for those circuits.

THE CHAIRMAN: You have described the BT buildings as DLEs or local exchanges. Are we to think of the CP's building as its exchange?

A. Yes. So BT will have a building and they will have a number -- there may be one exchange, one local exchange or there may be multiple local exchanges in there.

They may have multiple local exchanges and tandems in the same building. The CP's network in principle is the same. However, because they might not have the same scale as BT, they might, if you like, merge the DLE and tandem layer together and they might have fewer switches in there. But in principle it's carrying out the same function in that building.

PROFESSOR REID: Just to reinforce it, if I could. So the DLEs, as we normally discuss them, are technically BT DLEs which are locked in, to an extent, to 1980s technologies, still maintaining that?

A. Yes.

PROFESSOR REID: When it comes to the CP Group, it may be that they digitise that to an extent, and would it be in general true to say that they do not in general require large physical facilities, relatively speaking?

A. I think digitising is a little bit of a wrong term. BT's network is also digital. I think you are referring to the move from the TDM equipment to the NGN equipment which is a step up, but they are both digital technologies.

The NGN technologies, they can carry the same amount of traffic, but they are built in a very different way. One way to think about an exchange is that it has got hardware which is the physical port that you connect into, but also it’s a computer as well that manages the connection between them. Obviously BT's DLEs are from the 1980s, the computer technology was relatively more basic then than now with the NGN, so they are much more powerful. Similarly, the hardware that you connect into, electronics have developed so you can get more connectivity on a single piece of electronics. So they may have gained from those developments, but effectively they are doing the same thing, it is just in an updated box in terms of

the technology.

PROFESSOR REID: So it might be something like: for the 1980s version there are specific buildings that you go to, you travel to, and you might do some physical operations there, but essentially it is already digitised, but of a different vintage. Whereas if you go to modern CPs, they might be running an office with a super-server, or something like that, and will do lots of things from keyboards, rather than working manually?

A. Yes. It will be a question of degree as to how much automation there is and obviously the older the technology, the more manual intervention there may have to be. So obviously BT's on one end of that scale and the very new NGNs would be at the other end of that scale.

PROFESSOR REID: And then finally could I ask to what extent are there co-locations? Taking the case of TalkTalk, which took on the DLE deal, if they are co-locating, does that give them some advantage? Or does that mean they also have to invest in new technologies? Would they typically invest in new technologies?

A. Can I clarify what you mean by co-locating?

PROFESSOR REID: In the same physical facility.

A. So none of the CPs will have their equipment in the same location, the same building as the BT building.

PROFESSOR REID: None at all?

A. None at all.

PROFESSOR REID: Thank you.

MR LANDERS: Just one query, we heard yesterday that the ported calls are segregated from non-ported calls, does that make any difference to any of the things you said

in terms of cost or complexity, or is it not really relevant?

A. The segregation happens at the DLE, that's where the route is in play. So if you could route ported calls on the same routes that you have already built to the DLE, that is already there, then it would seem to be a case of BT repointing the traffic on the DLE. So rather than sending it to the tandem, sending it onto that existing route at the DLE. And that's a change of data in the switch that can be done electronically. Clearly if that route was already full, there would be overflow and you would need some time to expand that route. But you would not necessarily need to do it before you can move the traffic, you would just increase the overflow, as it were. Whereas, with the segregated products you need to put the new link in before you can move the traffic onto that route, so you would have to do this process of either adding a new interconnect circuit or rearranging the circuit from somewhere else before you could take advantage of the product.

THE CHAIRMAN: Could I ask one very basic question so I can visualise physically how what you are talking about works? Imagine that a BT customer in London telephones -- I hope Vodafone is a good example -- a Vodafone customer in Edinburgh and the call is not ported. How does this call travel? Perhaps you could just tell me - how does it travel in terms of buildings and fibre optic cables and so on?

A. Okay. So the BT customer in London will be connected to a BT digital local exchange in London. That would identify that the number dialled is an Edinburgh number. At that point it doesn't need to know, because of the way BT's network works, it doesn't need to know which network in Edinburgh it is, it will send the call to one of its parent tandem exchanges.

THE CHAIRMAN: That would be a BT parent?

A. That would be a BT parent tandem exchange, which might be in the same building as the DLE or might be in a different building, probably still within London. And that parent tandem will be connected to a BT parent tandem in Edinburgh directly over a long distance optical fibre network, and the call will be sent to that BT's parent tandem in Edinburgh. And at that point the call will be then routed to Vodafone.

THE CHAIRMAN: I should have made clear, I am not talking about ported calls here.

A. No, this is not a ported call.

Because Vodafone might be connected to a number of tandem exchanges in the Scotland area, BT may decide at London -- will make a choice between which tandem to send it to up in Scotland. But it will send it to a tandem up in Scotland which is based on the agreed routing plan that they have with Vodafone, and then they will hand the call over to a Vodafone exchange and Vodafone would carry it on its network to the terminating customer. And BT would carry it as far as it can on its network, so it would use its tandem network to the maximum extent it can before it hands the call over to Vodafone. So presumably that exchange in Vodafone's network that the call is handed to will be the only exchange in the Vodafone network that gets used, because that is where BT would pay the lowest rate to Vodafone of the regulated termination rate.

THE CHAIRMAN: And if I asked you the same question and it was a ported call, so the Vodafone customer was originally a BT customer but has ported his call. So the caller is still in London and the Vodafone recipient of the call is still in Edinburgh. How does what you have told us vary?

A. If the calling party is a BT customer in London?

THE CHAIRMAN: Yes.

A. The call would progress in basically the same way, apart from when it gets to the tandem exchange.

Let me take a step back. The call would proceed in the same way to get to the tandem layer in London and BT would then decide which tandem it's going to reach in Scotland, based on the assumption of where that number was originally hosted on its network. So it might send it to the same tandem that it used in the Vodafone case or it might send it to a different one, depending on its own routing in its own network.

When it gets to that parent tandem it will identify, through this call dropback mechanism, that the call has in fact been ported. So then it would route it to Vodafone and if it's connected to Vodafone at that parent tandem, it would use that route and it not it would need to send it by another parent tandem.

THE CHAIRMAN: Thank you very much.

MR LANDERS: I thought I was clear until the last answer.

We were talking about a BT customer in London who calls a Vodafone customer in Edinburgh. I understood that. If that BT customer now moves to O2, will the call then be sent from O2 to the original BT DLE?

A. Sorry, I may have misunderstood the question. I thought you said that the originating call remained on the BT network?

MR LANDERS: I know, I am changing the example, sorry.

A. Okay.

MR LANDERS: If that BT customer had shifted to O2, the call would -- O2 would - send it to the original BT number?

A. O2 would send it to the original BT number.

MR LANDERS: And then the route from that BT number up to Vodafone in Edinburgh, would that be the same as it would have been if it had remained on the BT network?

A. Perhaps if I slightly change your example, that might be helpful. If an O2 customer in London calls that number that was originally a BT number in Edinburgh and has been ported to Vodafone, O2 would carry it on its own network up to Edinburgh. It considers that call is to a number still on the BT network because it doesn't know it has been ported, so it would hand it off to BT based on what it thinks is the most commercially viable approach, which – for the majority of traffic is – to hand it off to the digital local exchange that the number was originally hosted on, and the customer is no longer there.

So that's different to the BT case where the call would only get to tandem and do a query. So this is a case where the call is carried by the originating CP on this network all the way to the original DLE, the host DLE. And at that point the call is recognised as having been ported to Vodafone, so the call needs to route to Vodafone. If Vodafone's not using the DLE handover product, it would need to be sent from the BT DLE back to the BT tandem exchange, in Edinburgh for example, and then on to Vodafone.

MR HOLMES: May I just interject with one question. There was one further scenario which we have not considered, which is the route that a non-ported call would take between O2 and Vodafone. Would that go anywhere near a BT tandem exchange?

A. That would depend on what O2 decides is the best way to route the call obviously, but there's absolutely no reason why it has to. It could be -- O2 could carry it on its

own network all the way to Edinburgh and then hand it off directly to Vodafone.

MR HOLMES: When we are considering BT's APCCs, are calls originating on BT's network relevant to APCCs charged by BT?

A. The calls originating on BT's network are not relevant to the cost of those calls, they are only relevant in the sense that the cost is -- they are included in -- the cost is spread over those calls because of the limitations in billing that I think Mr Young explained yesterday.

So the APCC works out the costing incurred by BT in carrying those calls that originated in O2's network in the example, but not the cost incurred in calls originating on the BT network. But then it divides that cost over both those calls because BT's unable to identify at the point where it generates the charging information where the call came from.

MR HOLMES: So if you are considering the routing between a non-BT CP to a BT ported number, now with another CP, and a non-BT -- a call from a non-BT CP to a non-ported number with another CP, can you comment on how those routes would compare?

Let's give them names. So we have got TalkTalk at one end and Sky at the other. The call firstly is a ported call from BT; to a number that is ported from BT. So it goes TalkTalk to Sky via whatever route a ported call would take. And then let's consider and compare that with the routing of a call from a TalkTalk customer to a non-ported Sky customer. Can you comment on how that routing might compare and whether one would expect it to be the same or different?

A. Yes, certainly. So in the case of the call that has been ported, TalkTalk, as the originator, doesn't know it has been ported, so it will route it to BT and it will try

and route it as close as possible, or hand it over as close as possible, to the DLE on which the number was originally hosted. And because TalkTalk's got quite extensive interconnection most of its traffic will be delivered to that DLE.

Then, once the call is identified as being to a ported number, to Sky, BT would then need to route that call from the DLE to one of the parent tandems and if Sky's interconnected at the parent tandems, it will be handed over directly to Sky. If Sky's not interconnected at one of the parent tandems, it would need to be routed to another tandem and handed over.

For the calls not to a ported number, so TalkTalk can recognise it's a call to a Sky number, it can send it direct to Sky and, given the scale of TalkTalk and Sky, I would expect that they would be interconnected directly so they would not need to use any transit providers.

MR HOLMES: And when you say they would not use any transit products, can you expand on which bits of BT's network, if any, would therefore be used; tandems and DLEs?

A. If they did use transit provider, which I would not expect them to --

MR HOLMES: Sorry, if they didn't use a transit -- sticking with --

THE CHAIRMAN: Can I just clarify that we are still talking about a non-ported call?

MR HOLMES: We are still talking about a non-ported call here and you say you would not expect them to use a transit provider and I am asking therefore whether a call passing between these two networks, which as you say have extensive interconnections, Sky and TalkTalk, you would expect the call to travel across either tandem or DLE switches on the BT network?

A. Because they are -- TalkTalk and Sky are directly interconnected, it wouldn't travel

over any switches in the BT network.

MR HOLMES: Very good. Thank you, no further questions.

THE CHAIRMAN: Thank you, that was very helpful. Oh, Mr Landers has another question.

MR LANDERS: Sorry, this is important. I am just wanting to make absolutely sure that I have understood.

Can you imagine that there is a BT DLE in London that has two calls that need to be routed to Edinburgh. One is from a BT customer of that exchange, and the other happens to have been ported in because an O2 customer started off on BT. Is the route that those two calls make from the DLE in London to the Vodafone exchange or whatever in Edinburgh the same? Or is it different, because in the case of the BT customer it's BT that decides where it goes? And in the case of the number that had been ported, it's the recipient that decides where it picks it up? Or are they both the same route?

MR HOLMES: If I could interject, would they be starting from the same originating exchange?

MR LANDERS: Just assume they are.

MR HOLMES: If the number hadn't -- if the number's ported, would they ever start from the same originating exchange?

A. I think the thing is that if you have got a customer that is originally on the BT network and they port to O2, they are no longer connected to the BT network at all, those calls will be treated completely separately. If there was a customer who was originally on O2 and they port the number to BT, then in terms of how the calls route, they will be treated the same by BT.

MR LANDERS: But the DLE in London can receive calls from two places. It can receive them from its customers, or from people that used to be its customers and are now being directed into it because that's the point of porting. Once that call's been directed in, because it has been ported, does it follow the same route to Vodafone as it would have done if it had originated (i.e. if that customer had stayed on that exchange)?

A. If the number was on the DLE in London that would be a London number that would have been ported. So the handoff of that call from BT to Vodafone would be in London: it would never be carried to Edinburgh.

MR HOLMES: Are you talking about the numbers at the originating exchange or at the terminating exchange?

MR LANDERS: I am just trying to establish --

MR HOLMES: Are you talking -- is it the customer who is ported, the one who is making the call in your example?

MR LANDERS: I am just trying to work out the costs of the routing from the DLE to the final RCP. Does it matter, in terms of the cost, whether in the process of getting from the DLE, -- whether that call has arrived at the DLE because a BT customer in that exchange happens to have made a call, or whether it has arrived at that DLE because it was ported in because the customer used to belong to that exchange, but doesn't anymore, and is now with somebody else? Because that is the element of the cost that we are debating, is it not?

A. Perhaps if I can slightly change your example and talk about -- the number is ported to Vodafone in Edinburgh. If a customer who is on that DLE in Edinburgh where the Vodafone customer -- the customer ported to Vodafone was originally

connected, because the number is ported, that call now needs to route from the DLE up to BT's tandem layer and then over to Vodafone.

If the call is handed over from O2 or TalkTalk to that DLE because they thought the customer was still there, it again needs to route from the DLE to Vodafone and it would go via tandem layer because there would not be a DLE handover.

So the routing would be the same as long as BT chooses to route those two calls in the same way on its network.

THE CHAIRMAN: Mr Holmes, I think you have seen that it would be helpful to the Tribunal, insofar as parties are going to rely upon comparing different types of call, to see such calls exemplified in some form of diagram, whether an existing diagram or a new one. I think that would be of considerable help to us.

MR HOLMES: I understand. We will liaise amongst ourselves and see if something can be agreed. If it cannot be agreed, we will agree in advance of closing our different versions and we will have to do our best to make submissions based on the witness transcripts to show which is the correct version.

THE CHAIRMAN: Thank you very much.

Mr Palmer?

Cross-examination by MR PALMER

MR PALMER: I am very grateful.

Just picking up on the exchange that has just happened before I go into cross examination, Mr Perry. Everything that you have heard ought to be capable of being the subject of complete agreement, but what has just been said, for one reason or another, is not entirely accurate. Rather than seek to iron that out through the medium of cross examination, which may lead to further confusion, what I am

going to suggest is that at some convenient point, perhaps with reference to the transcript once it's available, BT, Ofcom and the other parties produce another agreed statement of fact, illustrated with the diagrams that you have asked for, which sets things out as simply and plainly as we can.

A lot of the discussion that you have heard won't directly matter for my cross examination but if, as we go through it, there are points which arise we may have to stop and iron things out.

The starting point will be the existing agreed statement of fact but I am sure that we can amplify that to draw in matters which it doesn't currently cover, if that way forward is acceptable to Mr Holmes?

MR HOLMES: That seems perfectly sensible. As I said, we will try and agree what we can and if there is any difference, we will see where we get to.

THE CHAIRMAN: Yes, it's simply that as the evidence has emerged, particularly the cross-examination of Mr Morden, it seemed to us that examples are being used, very helpfully, that were not, as far as we can see, we may be wrong about that, exemplified in any of the diagrams. And that was the reason for our request. We are content to leave it to counsel to reach whatever agreement they can, because that is a far more satisfactory way of proceeding than cross-examination.

MR PALMER: Just simple statements as to how the network works in practice ought to be wholly capable of agreement, there's no reason why it shouldn't. If it's not capable of agreement we will have to see where we are and go from there, but I am sure it can be.

Mr Perry, good morning. I see from section 1 of your witness statement that you have worked for various CPs over time, including BT -- not long enough to get the

long service medal, but BT, AT&T and others -- holding commercial roles relating to interconnection.

A. Yes.

Q. Before you joined Ofcom in 2007. That's right?

A. Yes.

Q. So no doubt you will be entirely familiar with the sort of cost benefit analysis undertaken by CPs when they decide if, when, where to interconnect to other CPs?

A. Certainly. I understand how it was done in my experience, which finished in 2006 when I went to Ofcom.

Q. Yes. I just want to look with you at the drivers, the costs and benefits to CP in principle of making those interconnections. Obviously the volume of minutes delivered to any particular exchange varies considerably doesn't it?

A. Yes.

Q. And it's not in dispute between us, but it is possible for CPs to interconnect their network to BT's via transmission links at every BT DLE and tandem exchange?

A. Yes.

Q. It is technically possible?

A. Yes.

Q. And I understand it now that Ofcom accepts that it's likely to be commercially viable for some CPs to use the DLE handover product at some DLEs?

A. I would say that obviously we have seen Mr Morden's calculations and we raised some questions on that in terms of the amortisation, the use of -- the cost of capital and whether the RCP's costs were correctly taken into account.

Notwithstanding that, then I think we do agree that there will clearly be some cases

where it would be viable to use the DLE interconnect product.

Q. Yes. And that, for the Tribunal's notice, is recorded at Ofcom's skeleton at paragraph 55.

So the starting point is that CPs are not faced with an all or nothing choice as to whether they do or do not use a DLE handover product?

A. That's correct.

Q. In principle they can choose whether to connect to any particular exchange, whether that's at the DLE level or the tandem level; they can pick and choose?

A. Yes.

Q. So, given your commercial background and experience, no doubt you agree with Mr Rosbotham and Mr Moore that, for a CP, what matters in determining whether or not to interconnect at any given exchange to collect ported traffic is whether the cost of that specific interconnection can be justified by the volume of minutes expected at that particular exchange, as compared to the cost of purchasing inter-switch conveyance from BT.

A. Yes.

Q. That's the choice. They have always got the option of purchasing ISC, but whether or not as an alternative to that they interconnect to collect ported traffic, it's just a comparison of the costs; ISC on the one hand versus the cost of interconnecting the circuits as necessary, are there going to be enough minutes to justify the investment in those circuits?

A. Yes. Again, I would say it's the cost of the circuits and any cost that's incurred on the RCP's network.

Q. I will come to the cost to the RCP's network a bit later, but we can agree certainly that

total costs, against the alternative of ISC, they will choose which is cheapest on a cost benefit analysis for them?

A. Yes.

Q. And it's that simple cost benefit analysis that drives the decisions of CPs to interconnect?

A. Yes.

Q. I am going to ask you questions now specifically aimed at the DLE level. I will come to tandems later but I am now asking about DLEs. At the DLE level, whether a CP will interconnect or not, that cost benefit analysis that we have discussed, that will be done on the basis of a dedicated link at the DLE, given the terms of the DLE handover product which requires a segregated route; is that right?

A. Yes, so given the terms of product they would use the product specification to work out what the costs are and that would require a segregated route, yes.

Q. Because they will be concerned with the volume specifically of ported minutes at that specific DLE?

A. Yes, that's right.

Q. And that is, I think, effectively what you are saying at paragraph 80 of your witness statement?

Page 26 if that helps.

A. Yes.

Q. You have not used the words there, "Cost benefit analysis", but that's what it comes down to.

Now, a CP's not going to be concerned, in that context, are they, with the extent to which capacity at a particular link is utilised, provided that it is sufficiently utilised

that interconnection makes economic sense when compared with the alternative of purchasing ISC?

A. That is correct, yes.

Q. When Ofcom determined the Opal dispute, to remind us, when Opal approached BT and said, "We want, in principle, to be able to collect ported traffic at DLEs" -- up to then we know they couldn't -- Opal raised the issue of using existing routes to carry ported traffic, didn't they?

A. Yes, they did.

Q. So just to be quite clear about that, they were already interconnected at a very large number of those DLEs, so they had routes, they wanted to use the existing routes rather than installing new routes or reallocating routes so that ported and non-ported traffic coming across that DLE were segregated?

A. Yes, they certainly raised that as a point.

Q. We can have look at that if we can. If you take out bundle BT3 and turn to tab 35. This is the determination of that dispute, whereby Ofcom decided that BT must provide a product to allow Opal to connect that ported traffic at the DLE.

And if within that we turn to paragraph 6.54, which is at page 102, we see finally this is a recording on the subject of interconnection. Recording Opal's submissions to it, Ofcom records:

> "Finally, Opal proposes that should Ofcom decide that it [that is Opal] has to pay for the interconnection link costs incurred by BT in implementing DLE handover, it [that's Opal] should have the ability to decide whether BT should use existing DLE routes already implemented by Opal for other traffic types."

We know that Ofcom decided that Opal should pay for those links and what Opal are saying here is that if that's the ultimate answer that Ofcom gives, it should be able to decide to use the routes it has already for non-ported traffic for ported traffic as well; that's what it says?

A. Yes.

Q. But Ofcom did not make any decision that the ability to mix traffic in that way was necessary to make DLE handover fit for purpose or viable for CPs, did it?

A. We certainly didn't make a specific decision on that point, no. It was our assumption that that would be taken into account in discussions that TalkTalk had -- Opal had with BT.

Q. Ofcom left it to BT and Opal to decide between themselves; it wasn't something that Ofcom decided to rule on?

A. Yes.

Q. In that context, if you just turn back in the same document to paragraph 5.60. This is part of the determination which is dealing with that question about who should pay for these circuits. One of the arguments that Opal deployed in this context is at paragraph 5.60. We need not get into the technicalities of the argument but the idea is that it, Opal, should pay -- about 6 lines down it says:

> "It [Opal] considers that such an outcome would go against an established commercial practice as governed by the SIA. It stated that the SIA classifies ported call traffic as being 'owned' by BT, "which means the contract provides that BT is responsible for paying for the interconnection capacity (ie the connection and rental of the ISI links)" and that these provisions are separate from what party pays for

the conveyance of calls."

That was its argument. We just need to unpack that concept of ported call traffic being "owned", which is an odd phrase to use. And there's a footnote there to the SIA and I do not think we need to go into it. I think we can agree that what this means is that when traffic is “owned” by one CP, it means they are responsible for making sure that that traffic gets to where it’s meant to go?

A. Yes, that is correct.

Q. Approaching that at a very high level of simplification, but that's what it boils down to obviously; where CPs interconnect over the same network, there has to be very clear lines of responsibility for who, at the end of the day, is responsible for making sure the traffic gets to where it is meant to be going.

If the existing interconnect links at the DLE belonging to Opal are currently carrying non-ported traffic over that exchange from BT to them, using the same connection would mean that traffic owned by BT and traffic owned by Opal would be using the same link at the same time; that's right isn't it?

A. Yes, that is correct.

Q. That never happens elsewhere on ISI, does it?

A. I don't know for certain, my understanding was that traffic could be mixed on routes.That may just be certain types of route.

Q. There's one product called Customer Sited Interconnect, also known as CSI -- it's referred to in the agreed statement of facts as one of the categories of interconnection product -- in which BT provides the whole infrastructure: fibre, boxes at both ends, and it shares traffic owned by more than one CP at the same time and there's specific contractual cost recovery mechanisms to sort that out at

the end of the day.

That's CSI. We are not dealing with CSI here, are we?

A. That is correct.

Q. It could technically be put in, but that would also be at great expense?

A. CSI, yes.

Q. So aside from CSI, shared traffic, traffic owned by different parties on the same link at the same time would cause, if it were permitted, which it is not, considerable difficulty because one party would have an incentive to flood that link with its own owned traffic at the expense of the other party, who would then be overflowing. Do you follow that concern?

A. I understand the concern. I disagree with it in this context. My recollection -- I must admit this was some time ago -- was that Opal suggested that its own ISI links could be used and it could prioritise the traffic coming from BT, the ported traffic, and could reroute the traffic that it would send in the other direction via an overflow mechanism until such time as it could expand the existing routes.

Q. I will take this up with TalkTalk because there were discussions between BT and TalkTalk and not with Ofcom. But the purpose of my question to you at this stage is just to recognise that at its lowest there would be concerns, there would certainly need to be some sort of solution to that conflict between different parties owning different traffic on the same link and the problems of overflow.

A. I think that's true in principle. What I would say is that irrespective of whether the link is provided by CSI mechanism, ISI or any other mechanism, those approaches are commonly agreed already, there are mechanisms used as standard to ensure that you do not kind of flood from one end to the other, both at a commercial and

technical level.

Q. Are you talking about now or in 2010?

A. I am talking about in 2010 in particular.

Q. Focusing on in 2010, again I do not want to get too far sucked into the technicalities of this, but can you recognise that if the route did congest with Opal's traffic BT would then have its traffic overflowing via its tandem routes, which would cause it higher charges, fixed termination charges. Do you see that dynamic; do you recognise that as a real concern?

A. I do not understand how it would get higher fixed termination rates.

Q. Okay, I won't take that up with you.

Conversely, should Opal's indirect access and CPS traffic, that is their originating traffic flowing through the same pipe, overflow to Opal's tandem routes, can you see that that could at least then cause a problem charging the additional local tandem conveyance - traditional LTC element then consumed; is that something within your expertise?

A. That would be a case where a CPS call from the BT DLE to the TalkTalk network cannot use the DLE routing so it overflows via the BT tandem; is that your question?

There would be a charge then of LTC that would be incurred by Opal. In principle.

Q. In principle there would, whether that could be achieved in practice might be complicated, can I put it that way?

A. Again, I do not see why this would be complicated.

Q. It would in fact be impossible in 2010 as things stood?

MR HOLMES: Sorry, were you accepting the proposition that was put to you?

A. I do not know if it was possible or not.

MR PALMER: He wasn't disputing, as I understand, just saying he didn't know. I just want to take this no further than this with you, can you see (a), that there are potential concerns there, which would need to be resolved one way or the other?

A. Certainly I can see that there would need to be an agreement as to how all the different types of traffic would be handled.

Q. Will you accept from me at the moment, and I will take this up with TalkTalk, that BT raised these concerns with Opal at the time and Opal agreed with them?

A. I do not have any information on the discussions that happened between BT and Opal at the time.

Q. If that's so it would provide the right context for the Tribunal to assess Mr Holmes' suggestion in his opening that all that was happening here was big BT, big DCP seeking to inflate charges for others?

A. Again, because I do not know what the discussion was between BT and Opal, I couldn't comment on that.

Q. I see.

PROFESSOR REID: Might I say something briefly? Two things. I guess everyone will know that Opal became TalkTalk: it is helpful to be aware that of history. The other is this line-congestion idea,. Looking back to technologies I have used, I do remember a terrible device called a contention box, through which traffic, shared traffic, went. There was a kind of race at this gate to get through, and there were often overload problems, and this was technology of the 1990s. I think what we are trying to get at here is whether or not this kind of overload, or chasing for prioritisation of message flow, was a remaining problem come 2010, or not. It

sounds as though what you are saying technically, , is that by 2010 this could all have been readily handled?

A. Certainly the technology that I was aware of when I worked at AT&T and Global Crossing, which predates 2010, their equipment, their exchanges were able to overflow from one route to another so the traffic, once the route was congested, would take an alternative route. Albeit, using the example here, it would flow via the tandems and there may be charges. There may be a specific issue on the BT network with particular traffic types that I am not aware of that that question raises.

PROFESSOR REID: Thank you.

MR PALMER: That is the point, it is just a simple -- because of this concept of ownership, with different parties owning different traffic over the same link, you can see the conflict. No one wants to overflow unless you have very carefully controlled mechanisms to prevent that, agreement about how the shared traffic is going to be managed, that there's a conflict of interest between the two parties, each would want to use that link to the exclusion of the other, they do not care if the other party overflows. Do you see the point?

A. I do, it comes down to the commercial relationships that sit around that.

Q. Yes, and the commercial relationships which have been developed to resolve that problem was the CSI product which in itself would have required a new kind of link to be installed at further expense?

A. Certainly the CSI product exists. I didn't consider it was developed to resolve that specific problem but if that was the basis on which BT thinks-- it has been developed.

Q. I am grateful.

Can I go back to your witness statement next at paragraph 78. There you say:

> "Whilst the SIA appears to allow for overflow of ported traffic from a DLE interconnection route to the tandems, it also appears to prohibit, under normal conditions, use of this overflow due to the provision of insufficient capacity. This would mean the route provided to DLE for ported traffic would need to be dimensioned to carry all traffic under normal conditions. This may exacerbate the effect of requiring a segregated route."

Remember that evidence? But that issue of overflow, once you have got a segregated route, only one party using it, that will only arise in that link in question if it's already running close to full capacity. That's right, isn't it?

A. That is correct, yes.

Q. In those instances where a link is running also close to full capacity the link will have exceeded the break-even point for recovery of the cost of interconnection, won't it?

A. That would depend on the specifics of the circuit obviously.

Q. Well, let's unpack that. Mr Morden has given evidence, you will recall, we can go to it if you like, in his table 3 for example, at the DLE what the costs are. It comes out at about 6 or 7 per cent capacity utilisation being required to break even. There may be some dispute around the margins about that figure, but it's a long way short of full capacity at 100 per cent. So using that link at near full capacity you are going to be way beyond the break-even point, are you not?

A. That's one specific case where there's only an IBC used. Where the IEC is used the break-even point is higher and that would depend on the length of the IEC as well. So that would not necessarily be the 6 or 7 per cent.

Q. That takes us to table 5, but again that leaves you, even with a 30km link being provided, a 50 per cent break-even point for utilisation. Again, if you are close to full capacity, you are way beyond that?

A. Yes, I would accept that that would generally be the case, yes.

THE CHAIRMAN: Can I ask the question, it's to do with overflow. Can you please, if you go back to paragraph 78, you say:

> "This would mean the route provided to the DLE for ported traffic would need to be dimensioned to carry all traffic under normal conditions. This may exacerbate the effect of requiring a segregated route."

I am being a bit slow here, I do not understand why this would exacerbate the effect of the requiring a segregated route. Could you just~...?

A. If you could aggregate traffic with all the other traffic at the DLE, you would have a much larger route which gives you much more efficiency. If you are breaking that up and each route needs to be dimensioned to carry all the traffic, then that creates this issue.

THE CHAIRMAN: Thank you.

MR PALMER: Where I was with you, you are agreeing that you generally expect where you are at that level of risking overflow near full capacity you would generally be well beyond the break even point. In those instances where you are at full capacity BT allows a degree of overflow, doesn't it?

A. Certainly it allows overflow. In the contract it comes to a definition of what normal conditions mean.

Q. So if a link was routinely overflowing every single day, BT would be entitled to say

that you need to have another link and share this traffic across another link at least. But if generally there was not an overflow but there were particular times of peak demand where it happened to, you could say, well, that's still not happening under normal conditions. Precisely where you draw the line, I think is your point, may need to be clarified between the parties, but essentially that would come down to a realistic negotiated outcome between BT and the other CP, wouldn't it?

A. Yes, that would seem reasonable.

Q. Contrary to what you say at your footnote 22 on the same page, BT doesn't charge for that overflow?

A. That would depend whether there was any overflow in the sample period that is used to set the APCC. I think it would charge for it if it was -- if it was included in the calculation in that sample period. But if it occurs occasionally, then it wouldn't charge for it.

Q. You are saying when tandem overflow is used, that usage will be recorded and it will be averaged out over the year as part of the APCC; is that your point?

A. That's my understanding.

Q. There's no specific charge for overflow when it happens on a daily basis?

A. That's correct. But obviously there's also the flip side that if it is included in the sample, then you pay it throughout the period when that APCC is in place.

Q. You state at paragraph 82 of your witness statement that:

> "A CP using VICs in respect of its non-ported traffic would need to have a separate route for its ported traffic."

We pause and remind ourselves about VICs. VICs are virtual interconnect connections, they actually connect at the tandem but we all pretend they are

connecting at the DLE for billing purposes.

VICs are the same price as IECs aren't they?

A. Yes, that is correct.

Q. So it follows from that, doesn't it, given the DLE handover requirement for a segregated route is there anyway, a CP using VICs is in no different position to any other CP which needs to install a link, is it?

A. I think it would best to hear from the CPs as to why they prefer VICs in some circumstances. It may depend on the cost on their own network, but leaving that aside, I think that would be correct.

Q. Yes. So the CP will need to go through the same cost benefit analysis that we have already discussed in those circumstances, wouldn't it?

A. Yes.

Q. Yes. In deciding whether or not to make a connection at a particular DLE handover we have agreed that they need to have some idea of the level of traffic, in this case ported traffic, which they are going to get through that link if they invest in it.

So in order to do that, CPs will look at historic call volumes to inform that decision?

A. That is correct, yes.

Q. You will presumably agree with me that data based on historic information is necessarily imperfect as a guide to forecast for the future?

A. Yes.

Q. But CPs are used to that, that's their daily meat and drink in performing these forecasts, they are used to working with forecasts, they are used to working with estimates to inform those decisions, aren't they?

A. Yes, that's correct.

Q. And they are experienced in managing demand risk, are they not?

A. Yes.

Q. That's the risk that their estimated forecast may not in fact turn out to be accurate. So they manage those risks?

A. Yes.

Q. Again, it's part of the business.

Looking at the particular position at the DLE, an RCP will know how many customers it has on a particular DLE.

A. Yes, that's correct.

Q. That's not a forecast, that much. That's not network average data either?

A. No, that will be the actual customers, yes.

Q. That DLE, that number of customers, specific to that exchange?

A. Yes.

Q. It will also know the number of call that each customer has received?

A. Yes, it will do.

Q. Again, that information is data specific to the exchange in question?

A. Yes, that's correct.

Q. An RCP will have a historic record of levels of inbound ported traffic to a particular DLE?

A. Yes, that's correct.

Q. Yes.

A. If I could just clarify that. The information that CP has is all the traffic to numbers on that DLE. So it's the on-net and off-net discussion we were having, and where the

call is handed over, that is all included in their estimate.

Q. Yes, calls to those customers at that DLE. And they will also know, the RCP, the average split of OCP calls delivered directly to the DLE rather than the tandem layer, from the sample traffic data which is used to set the APCC?

A. So that's a network average figure across all of their ported traffic.

Q. For that CP?

A. Yes.

Q. You are pointing out that's network average not specific to the DLE; that's point you wish to make?

A. That's correct.

Q. At that level we are not dealing with specific DLE, but from that information therefore that's where the estimate comes in; they can estimate call volumes at a given DLE, can they not?

A. They could make an estimate, the question is whether they think that network average is a reliable basis for making such an estimate or not.

Q. I am just going to go a confidential document now. Be aware we are in confidential territory. Could you turn to bundle BT6 at tab 11 please. I am just double checking. I am going to tell you what this document is, it is the contents of the document that could be confidential, not the fact of it.

What is this document? This document is part of the SOR submitted by what was then Cable & Wireless. I do not want to say anything more about it. We can see that it was appended, if you turn to the final page of it, last page but one. Do you see that heading on the last page but one?

A. Yes, I do.

Q. If you just read what approach was being proposed to the identification of appropriate DLE routes. **(Pause)**.

Do you see that?

A. Yes.

Q. Do you see the similarity to what we have discussed?

A. I do see the similarity, but I think there must be some differences as well.

Q. It can be done?

A. In this case it's proposed as an approach.

Q. You certainly weren't saying, "You can't do it, you can't identify"?

A. Not in this case, no.

Q. No. If CPs -- we can put that away -- if CPs had needed more granular information than that, more than that method that we have discussed, in order to decide whether to invest at particular exchanges, at the DLE layer, Ofcom would have mandated the provision of that in the dispute?

A. I do not know that that question ever came up.

Q. So it was deemed not to be an issue at all, any difficulty at all by Opal?

A. We required Opal and BT to discuss technical and commercial requirements of that product, it was not flagged to us that that was an issue between the parties.

Q. The result is, in practice, we can see, CPs do have sufficiently accurate information, maybe imperfect, but sufficiently accurate information to estimate call volumes at a DLE to decide where to interconnect, don't they?

A. I think it was down to the CPs whether they considered that that information was sufficiently reliable or not, I can't really make the decision for them.

Q. Perhaps we can agree this much between us. At the very least this sort of approach

allows the CP to rank DLEs in order of importance, as Mr Morden explains in his second witness statement; that's right, isn't it?

A. I do not quite understand what the importance measure achieves.

Q. The most attractive DLE to connect at, ranked in order.

A. I think what they can do is rank the DLE in terms of the total traffic they get from them. If they do not consider that network average is a sufficiently good measure for each DLE, then it's difficult to say that that ranking accurately works for just the off-net traffic handed over at the DLE, you are using an assumption you do not believe in to do that ranking.

Q. Let's inject a little bit of real world commerciality into that. Do you remember Mr Morden's particularly instructive graphs, illustrating that it's only a small percentage of DLEs which provide 50 per cent of the overall minutes?

THE CHAIRMAN: Would it interrupt your flow if we had a quick break just now?

MR PALMER: Can I just finish this point and then that would an appropriate place? I am very grateful.

If you go within Mr Morden's second witness statement to paragraph 21.

PROFESSOR REID: Which tab is this?

MR PALMER: Mr Morden at tab 2 of BT6. Paragraph 21, that's an important point. Three lines down:

> "50 per cent of minutes come from the largest 27 per cent of DLEs and by the time an RCP has reached 50 per cent of DLEs it's collecting 75 per cent of all the minutes."

Then there's a tail where the last 158 DLEs account for only 7.5 per cent of the traffic. So if you look at that graph, at the major end of the spectrum, the busiest

DLEs carrying the most minutes, you can apply an average. Knowing the precise number of ported minutes going through DLEs, you get a clear view of where the commercially viable routes are going to be.

A. I understand that this graph isn't specific to a particular CP, so they would have to draw their own graphs where the distribution may be slightly different. But I do accept the point.

Q. It's no more really than saying that the exchanges in London and Birmingham (inaudible) are going to be an awful lot more busy than the one in the Shetland Islands, at Lerwick for example.

That's the end of that point. I am going on move on to tandems next.

(11.48 am)

(A short break)

(12.00 pm)

MR PALMER: I am very grateful.

Mr Perry we are going to move now to questions about the position of the tandem layer. Obviously before the break we were dealing with the local exchange layer. Now the tandem layer. You quite fairly say at paragraph 100 of your witness statement that:

> "The five largest CPs will interconnect to a large number of tandem exchanges across the country. This will mean in many cases they do interconnect to tandems where the traffic is handed over."

If I could ask you to turn to Mr Morden's first witness statement, that's bundle BT1, tab 3. Can you turn to paragraph 86 which is on page 29. We can see there on the second sentence in that paragraph:

"The largest five operators receive 94 per cent of the ported minutes coming from BT."

Do you see that? And if you turn the page to table 2, whose precise contents are confidential, but if you could look at the first row which deals with the proportion of ported calls delivered to tandem switches by OCPs that could be directly collected by the RCP.

We can see from those figures for each of those, there's one notable exception, that the vast majority of ported calls delivered at the tandem layer are being delivered to existing interconnected switches?

A. Yes, that's correct.

Q. So when we are considering the ability of CPs to build out to new tandem switches, we are actually talking about a small proportion of ported calls given the extensive interconnection that already exists, aren't we?

A. Yes.

Q. We bear in mind in this context, at the tandem layer there's no need for a segregated route which is used solely for ported traffic, is there?

A. That's correct, there is no need for that.

Q. So, in determining whether to connect to a new tandem we have already explored that a CP will know the inbound ported traffic volume to a particular DLE, we have been there. A CP will know which tandems are connected to a particular DLE. BT publishes, "Network information publication principles", but published in that the particular DLEs which all CPs have access to, what tandems they are connected to. So a CP will know which tandems are connected to the DLEs with the highest volumes of ported traffic, won't they?

A. Yes.

Q. If you turn in that same bundle, BT1, to Mr Young's witness statement. At paragraph 27 just to remind ourselves of these groups by which the APCCs are fixed according to the routing arrangements. Of all the 10 APCC groups, it's groups 2, 3, 4 and 10 which relate to calls being routed in and out of the tandem layer. That's right, isn't it?

A. Yes, that is correct.

Q. So by adding up the minutes falling within each of these groups a CP will know how many ported minutes are arriving at the tandem level?

A. That would be arriving at that tandem level that then consume inter-tandem conveyance.

Q. And so they can then formulate a view as to how many additional minutes they could pick up by interconnecting further at the tandem level, can't they?

A. Yes.

Q. Of course, the CP will also have a view of the costs involved in connecting on each tandem that it is not currently corrected to, won't it?

A. Yes.

Q. So similarly from that information, the cost information and the number of minutes arriving, a CP can construct a ranking of importance, an order that most viable and most profitable for them, for those remaining tandem switches that they are not already connected to, couldn't they?

A. I think there would be a complication. First of all, in order to work out the traffic for each DLE we talked earlier about the reliability of using that network average assumption. That also gives them the figure at the tandem. So that figure is subject

to that same assumption and then they would need to think about how to split that traffic across the parent tandems that they are not connected to. So if a DLE has got three parent tandems and they are connected to one of them, they would need think about how they would assume that traffic is split across those tandems.

Q. So they are using the same average split tandem DLE that we were talking about earlier, the other side of the same coin?

A. Yes, indeed.

Q. So the same level of information. On that basis they can -- and bearing in mind what you say about there being more than one parent tandem, they can still form an order of importance to them?

A. They could, with the same shortcomings that we talked about with DLEs.

Q. So they can make an informed commercial decision, bearing in mind it involves forecasts, bearing in mind it involves a degree of estimate, they can make a commercial decision as to which tandems to interconnect to, can they not?

A. Again, if they think that those assumptions are accurate enough to base it on, then yes.

Q. Let's explore the situation where they want a bit of further comfort beyond what we have discussed. They could exchange information with other CPs, couldn't they?

A. In theory they could. Obviously they are competitors with each other so they might not feel they want to exchange information about how they connect to BT.

Q. They could ask BT for information?

A. They could ask BT, yes.

Q. One thing they do know is described by you in your witness statement, paragraph 90. They get data from BT indicating that they pay ITC if they hand over calls at

tandem 1 but not if they hand them over at tandem 2?

A. That is correct. This is for a non-ported call.

Q. Yes. The same applies, doesn't it?

A. Yes.

Q. So that information can be used to further improve the accuracy of the forecasts of traffic at different tandems, can't it?

A. I think because effectively you will be reversing the situation to use that information for porting traffic, so, effectively, I do not know how to simply explain this, CP (a) would know where CP (b) is interconnected for a non-ported call and so it could use that to try and estimate where CP (b) would hand traffic over. But CP (b) may not hand traffic over in that particular way to BT. When CP (b) originates calls to ported numbers, because you are effectively reversing that data in your suggestion, it doesn't necessarily reverse to say the same thing.

Q. Let's just think about this. They could tell themselves, from their own information, whether they were being charged single tandem transit or double tandem transit to reach a given other CP?

A. So CP (a) could do that to understand CP (b), calls to CP (b), yes, that is what that diagram shows.

Q. So CP (a) can deduce whether CP (b) is connected at a particular BT tandem switch or not?

A. Yes, it can.

Q. Yes. And by carrying that exercise for other CPs -- CP (c), CP (d) Cp (e) et cetera -- then CP (a) can build up a picture of which CPs are connected to which tandems, can't they?

A. The thing that the routing information tells you is effectively the way BT routes calls to CP (b), and you pick up that routing. So for a transit call it says that if I interconnect at BT tandem 2 to this particular number range, that would be handed over a single tandem.

So that would tell you that CP (b) is interconnected to tandem 2, it doesn't tell you how CP (b) routes traffic to BT. It may have other interconnects it uses to route traffic in, and that would be what delivers it to the parent which it needs to connect to.

So I accept that you could build up an understanding of how CPs interconnect. Whether that is useful, I think the CPs may have a view on that, but I think there may be some issues that might need to be considered.

Q. But you agree with me that you build up a picture of where other CPs are connected at the tandem layer?

A. You could build up a picture, yes.

Q. And you agree with me, I think, that you can use that information to improve the accuracy of the forecasts?

A. I think you could use it to help improve it. Whether it would be sufficient to make a decision, that would be for the CPs to decide.

Q. Again you end up on the left of that chart that we went to in Mr Morden's statement at the bulk end of the traffic with a pretty clear picture of whether it's going to be viable, or not, don't you?

A. Certainly you can identify, yes.

Q. Of course if you do connect at that tandem layer, you can then use that link for any type of traffic?

A. That is correct, yes.

Q. And you can reduce potentially transit costs that way as well?

A. Yes.

Q. Could I ask you to take out Mr Farmer's witness statement, which is in bundle G1.

A. Bundle G1.

Q. Bundle G1, the Gamma bundle at the first tab. I have it marked at tab A but Mr Holmes' was unmarked, but it's that first tab.

Within that can I ask you to turn to paragraph 23, please?

PROFESSOR REID: Which tab?

MR PALMER: The first tab of the Gamma bundle. You should have the witness statement of Peter Farmer there.

I am told it is the second tab, sorry my bundle is different from others, it turns out. The second tab. Do you have it?

A. I have it.

Q. I am very grateful to you. Does the Tribunal have it? Could you turn to paragraph 23 please. Some of this paragraph is confidential. The first two sentences are not.

What Mr Farmer explains, in his experience, he says:

> "... smaller operators generally do not interconnect an as deeply with BT as has Gamma. In simple terms, they lack the financial capacity and in any event do not have the call volumes to warrant the infrastructure costs and overheads involved."

You presumably agree that smaller CPs will have more limited networks, correct?

A. Yes.

Q. Those smaller CPs will therefore be more reliant on conveyance services from other

carriers for all their traffic types, not just ported traffic, correct?

A. Yes.

Q. And indeed ported calls will just be a small element of that traffic?

A. Yes, it will be an element.

Q. And the fact that those smaller CPs are more reliant on conveyance services from other carriers has not prevented Ofcom from finding that inter-tandem conveyance and transit is effectively competitive, has it?

A. That's correct, yes.

Q. Despite the fact it would be completely unviable for those smaller CPs to connect everywhere for non-ported, any more than for ported traffic?

A. That's correct.

Q. So it's on that logic that those smaller CPs, the fact that those smaller CPs are more reliant on ISC from others doesn't prevent ISC from being viewed as contestable, does it?

A. That's correct.

Q. I want to turn now to the costs involved in interconnection. We saw yesterday that the SIA provides that an RCP can obtain a rebate if any interconnect circuits are ceased up to 10 years after purchase; that's right, isn't it?

A. Yes.

Q. I think in the first year, Mr Morden talks about half I think we will probably agree, it's about 40 per cent in the first year and then it goes down in 10 per cent increments each year to 0?

A. I don't have the detail.

Q. You don't have them. But it's over that 10 year span, that that happens. It's

reasonable, isn't it, for that amortisation period to match the economic life of that as well, isn't it?

A. I think this is an area that's outside my expertise.

Q. Okay. In terms of the costs of new links at the CP end, you gave some evidence this morning, again, we will see if we can agree it all in due course so that the Tribunal have a very clear picture of what happens at each end of these links.

Let's start with this point: at the CP end of the interconnect link, the ported traffic from the DLE will still go to the same RCP switch, won't it?

A. Well that would be for the RCP to decide which switch it wants to connect to, but that would be reasonable.

Q. Normally; there might be exceptions, is what you are saying. So a new link between the transmission system and the RCP switch won't normally be needed, will it?

A. Could you repeat that?

Q. A new link between the transmission system used by the RCP and the RCP switch won't normally be needed, will it?

A. I think you're talking about in the CP's building, that would depend on exactly how they've configured it, if they've connected all the available 2-megabit links on that physical interconnection link out to their switch equipment, and the new equipment may do that as one, so it may be that it's provided already.

Q. This is where one of the areas of disagreement between us comes into focus. Let me try and see what we can agree now just on this limited point and, if not, we will take it off-line and see if we can come up with an agreed statement. We can agree that there are physical changes that need to be made at the end of BT's system?

A. Yes.

Q. That's common ground. It's common ground that BT provides links to its switches via 2-megabit per second connections?

A. That is correct.

Q. That is in the agreement statement of facts as well. But the more modern types of network than BT's, of the type operated by RCPs next generation networks, IP-based networks, can connect transmission links to their switches using high capacity fibre, can't they?

A. Yes, they can. The IP's not relevant in this context because they are connecting to the TDM from BT. As I said, the new equipment might provide for those connections to be made on fibre so, effectively, the high capacity link would connect on to the CP switch without having to be broken down externally into the individual 2-megabit circuits.

Q. Those fibres carry many 2-megabit channels; you don't need to change the fibre, they've got those 2-megabit channels within the fibre?

A. Yes.

Q. We can see that at paragraph 26 of your statement, we're agreed on that much. Do by all means look at it.

PROFESSOR REID: What paragraph was that?

MR PALMER: 26.

PROFESSOR REID: Thank you.

MR PALMER: It's the individual circuits with a capacity of 2-megabits within the fibre. In those circumstances, any new connection at the RCP end doesn't involve the same implementation of a physical connection that's required at the BT end, does it?

A. That's correct, yes.

Q. So there's no 2-megabit increment in terms of adding a new 2-megabit circuit, the cost of the 2-megabit circuit, there's no increment there, is there?

A. That's correct, yes.

Q. They can connect their new 2-megabit route electronically by making a few entries on their computer keyboard?

A. Yes, that's right.

Q. And the costs of doing that are negligible?

A. In terms of whatever time it takes the engineer to do it.

Q. So looking at your paragraph 26, you refer to additional circuits using up switch ports on the CP's and BT's exchanges, but the material cost to the RCP is at the BT end of the circuit, isn't it?

A. Well that would be true if the CP has implemented the equipment we were just talking about, it would depend specifically on what equipment they're using, yes.

Q. Let's have look, for example, at Mr Rosbotham's statement, that's in the CP bundle at tab 2. If you turn to page 7 and look at footnote 14. The point that he is making here is at the BT end there's 600 plus DLEs but at the CP end, turn over the page as the footnote continues, the handover is likely to be across six or so interconnects, six or so nodes at the CP end?

A. That's correct, it does say that, yes.

Q. So we are looking at the very limited category of cost aren't we, at the CP end?

A. Well I think Mr Rosbotham's footnote relates to an IP to IP connection, rather than a connection connecting an NGN to BT.

Q. He is using that information to make an entirely different point, but just in terms of

the fact of the 600 plus, versus the six, is what I want to draw out; you agree with that?

A. Yes.

Q. Going back to your witness statement still at paragraph 26 if you still have that open. The final sentence, you also refer the need for, "Engineering resource required to design, configure and test new connections"? But, again, in this context, planning and optimising a network is an everyday occupation for CPs across all its traffic types, isn't it?

A. Yes, it is.

Q. And so designing, configuring, testing interconnection links for ported traffic is not going to require any material additional expenditure, is it?

A. It might be part of the work that they generally do, it's part of the business.

Q. Part of the business. In fact, no allowance for any such costs was made in the Opal determination was it? There were treated as being immaterial?

A. I can't recall.

Q. Do you want to look at that. Do you remember it's bundle BT 3, tab 35 at page 25, paragraph 3.64:

> "You did not offer data or estimates of that cost, work minimum already flow traffic for the BT network ...(Reading to the words)... so just treat it as effectively immaterial."

A. I believe this paragraph is referring to rerouteing traffic on the network rather than providing the interconnect circuits.

Q. Sorry your voice dropped?

A. I read this paragraph to mean that it relates to the cost to rerouteing traffic not of

providing and testing interconnect services, etc. It says "in addition to interconnect costs".

Q. So you think that deals with something else?

A. I believe so, yes.

Q. The actual work involved from an engineering perspective in managing that interconnection is minimal?

A. I'll let the CPs say how much work's involved.

Q. I see, okay. We are still dealing with keystrokes on the computer, aren't we?

A. In terms of paragraph 3.64?

Q. Let's stay with our context, in terms of setting up the interconnect links which we are concerned with?

A. Yes, that is probably the case.

Q. It goes beyond that. Let's just go back to Mr Farmer, again, if you could take out the Gamma bundle once more. Second tab. If you turn to paragraph 51(b) please, on page 17. Just pausing because of the confidential content. I can say this much, that what emerges from that is that a CP who chooses to interconnect at the DLE layer will achieve some savings by reducing the number of interconnect circuits at the tandem layer. Don't need to go into any specifics. As a broad proposition?

A. Certainly as a broad proposition if you take the traffic off at the DLE it's no longer using the tandems.

Q. So you can save on those interconnect circuits as well?

A. Yes. It may not be an exact one-for-one match, it depends on how the traffic aggregates and so on.

Q. I understand that, but that's a cost saving, it would go into the cost benefit analysis of

the CP?

A. It should be included.

Q. That's all I want to ask you about the costs. Let's move to third party transit. We deal with that in your witness statement from paragraph 101 onwards, 101 to 114, you are familiar with the issues?

A. Mm-hm.

Q. Let's start from this point. There are numerous operators which offer third party transit of non-ported calls; that's right, isn't it?

A. There are operators, I don't know of the number.

Q. It's very common in the non-ported world for transit to be offered by third parties?

A. It's certainly offered, yes.

Q. It's something they do on a wholesale basis, and so forth. It's common ground that at present no CP currently offers third party transit of ported calls from the DLE?

A. Yes, that's correct.

Q. We're all agreed on that. But there's no technical distinction, is there, between carrying ported traffic and non-ported traffic?

A. In terms of technical, you mean they can use the same circuits and so on?

Q. Yes.

A. That's correct.

Q. So it's equally possible isn't it, for a transit provider who wanted to, to use the DLE handover product to collect ported traffic, aggregate it for a number of CPs but on any particular given route?

A. From a pure technical perspective, that should be possible.

Q. Yes. They would need that DLE handover?

A. Yes.

Q. If they are going to collect it from the DLE?

A. Yes.

Q. But then they can aggregate different CPs' traffic and transit it on in the normal way, from a technical point of view?

A. Technically, nothing stops them doing that.

Q. So the question for a potential transit provider would in essence be the same question as we have already explored, wouldn't it, whether the costs of interconnection on the basis of a segregated link for ported traffic can be justified by reference to expected, demand for aggregated traffic?

A. I think that commercially that point is correct. There's also the question of whether the SIA supports the use of third party transit.

Q. Leave that point aside, I am just straightening on the technical aspect. The potential transit provider would no doubt need some sort of billing solution for that, to know who to bill each CP, that would have to be resolved. But, technically, no difficulty. So it is possible that a wholesale product for ported traffic could be provided by any CP who has or who took out reasonable levels of connection to BT switches?

A. Yes.

Q. So it's not the case that only TalkTalk group could provide a transit product from a DLE?

A. Well at the moment they could but if somebody else deployed DLE handover, then --

Q. They could at the moment because they have got DLE handover in place, but anyone else, all they would have to do is buy the DLE handover. Whether or not that's commercial decision for this would depend on the cost benefit analysis?

A. Yes.

Q. And the same applies of course at the tandem layer, where there's no problem with segregation, you don't have to worry about a specific handover product there. But, again, they can collect aggregate, send on ported traffic. Indeed, Gamma through what it describes at hosting services does precisely that, doesn't it, in effect?

A. I'm not aware of the specific services that Gamma provides but it does state it supports a hosting service that does that.

THE CHAIRMAN: Professor Reid would like to ask a question.

PROFESSOR REID: Mr Palmer, just to get orientation on the line of reasoning, would I be correct in thinking that your last few comments have related to the idea of contestability?

MR PALMER: Well, in due course that would come in, in a number of contexts. But the key point which I am exploring certainly begins in that contestability question where we say there are alternatives to ISC. But one of the alternatives that BT has put forward is transit. One of the answers which has been given to that is that at the DLE level at least there is no transit currently being provided. The fact that it could be provided, we say, is a constraint on BT's price and if BT put up its price for providing that service that in itself could create an opportunity, depending on the cost benefit analysis to come in and provide it. The fact that it's not being provided at the moment is an indication that BT is doing so efficiently and competitively.

PROFESSOR REID: That's a possible line of reasoning.

MR PALMER: It's a possible line.

PROFESSOR REID: Thank you.

MR PALMER: It's true isn't it, I think we have covered the ground earlier, we are

talking about the need for forecasts and estimate again and in the context of that cost benefit analysis and we have talked about the need to manage the risk attached to managing demand.

A. Yes.

Q. That's part of any product launch planning. We have already of course explored earlier the ability of RCPs to sufficiently accurately forecast call volumes at different exchanges, both DLE and tandem, we have been through all that.

A. Yes.

Q. It's on that basis equally that an RCP, even if they decide not on the basis of that information to interconnect for themselves, they can pass the fruit of their enquiries as to the level of ported minutes coming to them at those exchanges to a potential transit provider to help the transit provider identify those exchanges where it would be willing to provide a transit service.

A. Yes certainly, if the transit provider or the potential transit provider was available then the RCP could provide it the information as to the negotiation.

Q. So that information would be sufficient for a potential transit provider to assess the attractiveness of providing the service on an aggregated basis, rather than on an individual CP basis?

A. Yes, again, it comes down to those shortfalls identified as well, how they manage that in their risk.

Q. Of course they don't have to, the transit provider doesn't have to service all exchanges, they could pick and choose in precisely the same way as CPs do?

A. Yes, from a technical perspective, yes.

Q. Let's come to the contractual issues that you mentioned earlier, let's deal with those

now. First point to make is that the SIA isn't set in stone; it does change?

A. Yes.

Q. And it regularly changes as markets develop, doesn't it?

A. Yes.

Q. So CPs spotting an opportunity can come to BT and ask that amendments be made to accommodate it, it has seen a potential development in the market?

A. Yes, I believe that's the case, yes.

Q. You have said at your paragraph 112 of your witness statement, and I am going to have a look at it. Final two sentences you have said.

> "If an RCP instead wanted a third party transit provider to collect its ported traffic at BT's exchanges, then this would need to be provided for in the contractual arrangements under the SIA", as it's not presently covered.?

A. Yes.

Q. Mr Morden has explained in his second witness statement why, so far as BT is concerned, that's not in fact the case in light of the definition of the word "recipient" in the SIA. If you want to refer to that, do, it's in bundle BT6 at tab 2, paragraph 60, where Mr Morden explains there that that isn't right, that ported traffic is onward routed to whichever CP is designated within the contract as owning the traffic, that phrase again, the recipient as defined in the SIA, as the party to whose system the geographic number is being ported. So this could be the actual RCP or a transit provider, do you see that?

A. Yes, I do.

Q. Of course the SIA as currently worded permits Gamma to effectively operate a transit

service at the tandem level by hosting a number of ranges on behalf of other CPs, doesn't it?

A. Yes, it does.

Q. I will say this, there's no issue there with the SIA?

A. I would pick up the point that, if I am an RCP, I can take the hosting arrangement and in that case Gamma looks like the recipient in terms of the SIA. If I want to take traffic on some tandem exchanges via a transit provider and some via my own network because I avoid inter-switch conveyance using my own network, then there will be two providers. I guess the question is, how is that covered for in the SIA, who's the recipient in that case, where the calls could be to the same number but, because they're routed differently, they go to different providers.

Q. So the CP would want to be given comfort that the word "recipient" would be interpreted as compatible with that arrangement in either case?

A. I think those are the sorts of issues that I was considering, yes.

Q. So if there was a perceived issue, the scope of the SIA, for that reason or for any other, the potential transit provider could come to BT and ask if necessary for the SIA to be amended or at least an assurance that there was no need because it was broad enough cover that situation.

I think at your paragraph 114 on the next page of your witness statement I think you fairly accept the real question is whether the cost benefit analysis stacks up for a potential transit provider; that's right, isn't it?

A. Yes.

Q. That's third party transit. I am going to come next to direct routing. Let's start with a statement of the obvious: CPs are not fully interconnected in the UK, are they?

A. No.

Q. Each one with (Inaudible). Also, CPs use a mixture of network technologies, don't they?

A. Yes.

Q. So in some instances a customer will port to an RCP that has less interconnection with an OCP, than the OCP has with BT.

A. I think that's right; could you repeat it?

Q. Shall I do it again? I will do it again. BT has lots of interconnections with lots of OCPs. If a BT customer ports to an RCP, it's quite possible that that RCP will be less well interconnected with other OCPs than BT was?

A. Yes, that's correct.

Q. BT's very widely connected; a smaller one you can expect to be less widely interconnected?

A. Yes.

Q. So in those instances there will be additional conveyance costs compared to a non-ported call, won't there, even if the call is directly routed to the RCP?

A. I don't understand where the additional costs would come from in a ported versus a non-ported scenario.

Q. The additional conveyance costs arise because, under the new RCP, because they are less well interconnected, they will have to use new levels of transit in order to connect the call at all?

A. Would that not be the same for a non-ported call from that OCP to that RCP? So you would use the same routing between those two CPs.

Q. That would be the same, but comparing the situation before and after the port, do you

follow?

A. So, before the port, the call routes directly from the OCP to BT, and after the port the call routes from the OCP to a transit provider to the RCP.

Q. Exactly.

A. That's correct.

Q. And there can be additional conveyance costs arising from that?

A. The costs would be different when you go via a transit provider than when you go via a direct interconnect to BT.

Q. The costs can be higher?

A. Yes.

Q. That's all I need from you, I will explore direct routing otherwise with the CPs. Lastly, treatment of mobile interconnect links. We haven't done much on this so far, so let's pause and put this point in context. This is the comparison that BT makes in its evidence between the treatment of ISC as ported conveyance, porting conveyance by Ofcom, as compared to what it says happens in the mobile world, it says there's an inconsistency, I just want to explore that topic with you. Could you turn please in bundle BT 1 to tab 9. This is the Ofcom review, we can see that in the cover page there, the review of mobile donor conveyance charges for the period 2015 to 2018. Donor conveyance charges, putting it simply, it's the mobile world equivalent to the APCC in the fixed world?

A. Yes, that's correct.

Q. Slightly different terminology, essentially the same idea. Could you turn to page 7 of that document? This is section 3, analysis of consultation response and our final decision. We can see from the first sentence of paragraph 3.1 what this section is

going to deal with. We summarise our proposals, stakeholders' response to proposals and our analysis and final decision. It goes on then to consider the stakeholder responses to its consultation in section 3 and sets out what it makes of them. That's what we are dealing with here. So the purpose of this document is to allow stakeholders to understand the reasons for Ofcom's decisions?

A. That's correct.

Q. That's what it's there to do, to set out very transparently what was said to it and what its reasons are for arriving at its final conclusion, very standard.

A. Yes.

Q. This first section, we can see there's a subheading under 3.1 "Methodology for Calculating Maximum DCCs", donor conveyance charges, and it starts by setting out what the proposals were in the December 2014 consultation. That's the context. Over the page, on page 9, paragraph 3.10, Ofcom sets out its position in respect of transmission costs and states in the first instance that, "it has excluded them", it has excluded transmission costs; that's right, isn't it?

A. Yes.

Q. In the next sentence Ofcom recognises that a donor provider might incur transmission costs in onward routing calls; that's the first clause, isn't it?

A. Yes.

Q. Just pausing at that point, there's no dispute that those transmission costs exist; that's right, isn't it?

A. That's correct, yes.

Q. It goes on to state:

"It has decided to exclude those costs because [use the words on the

page] they are already recovered between the donor provider and the recipient provider under separate commercial arrangements."

There's no reference there to the issue of materiality of those costs?

A. That's correct, in that paragraph, there isn't, no.

Q. There's no suggestion that there's no such costs?

A. There's a suggestion that they might incur those costs.

Q. Yes. If we go in your witness statement please to paragraph 142, you say that "the approach to mobile transmission links were set out in Ofcom's determination of the DCC of 14th February 2014". If with we turn to that, the reference there is BT5, tab 39. If we turn within that to page 26 and look at paragraph 4.68. Just have a read through that paragraph. **(Pause)**. Do you have that?

A. Yes.

Q. Again:

"We recognise that a DNO might incur transmission costs in onward routing ported calls [that's stated very clearly] but consider that it is not appropriate for these costs to be recovered through the DCC as the costs of interconnection links ...(Reading to the words)... are already settled commercially between the DNO and RNO under separate arrangements outside of the DCC."

Again, no reference to materiality, is there?

A. No.

Q. Just a reference to those commercial agreements?

A. Yes.

Q. Turn back it your witness statement please at paragraph 144, you state there that:

"The approach taken to physical interconnection links in setting the DCC is the same as the approach to physical interconnection links in the APCC where the costs have not been included in the APCCs because the interconnection link is provided to carry a range of traffic in addition to porting and as a result there would be little or no incremental costs of also carrying portability traffic on it."

Where does that reason appear in Ofcom's determination?

A. My understanding is that that was the approach taken here. That was based on the estimate of the amount of traffic on those links which is referenced in the document, I can find the paragraph, and that was where it decided that there was little or no incremental costs. I do accept that was not flagged in the paragraphs you read out.

Q. It's not flagged, it's the opposite, isn't it; there's a recognition that there are costs that were recovered by commercial agreements, is what Ofcom said to the industry in its determinations?

A. That's certainly what that paragraph states.

Q. I'm very grateful to you, those are all my questions.

THE CHAIRMAN: Somebody else wish to cross-examine?

MR BATES: Not from me thanks.

Cross-Examination by MS LOVE

MS LOVE: I have some very brief questions, Mr Perry. Firstly, just to clarify from the transcript. You will recall that Mr Palmer took you to Mr Farmer's witness statement about small operators and them having to place greater reliance on conveyance services. The proposition was put to you that ported calls were a small

element of traffic. I had thought that you said they were an element, but just to be absolutely clear, were you accepting that they were an element in this sense of one element, not the only component, or were you accepting that ported calls for a small operator are a small element?

A. The former; it's an element, not a small element.

Q. My second question is that Mr Palmer referred you, before the short break, to a range of sources of information that an RCP needs to be able to forecast for volumes to make informed commercial decisions, building a picture. How much of that information is readily available to a potential new entrant?

A. I am trying to remember the specifics. The information that's readily available is the structure of BT's network which is available through the information it provides. The information, the structure of BT's network will be available. If it's a new entrant then there's a question about whether it's got traffic, but to the extent it has got traffic then that would be available to it, it could measure it's own traffic and it could request from BT the calculation of the APCC, I believe. But obviously if it's not porting any numbers, they wouldn't get that information.

Q. So beyond whatever traffic you might have and the public information about BT's network come down to making requests from established CPs, or potential competitors, and possibly trying to get Ofcom to them to tell you?

A. I think that's right, yes.

Q. Thank you.

THE CHAIRMAN: Mr Holmes, do you have any further questions?

MR HOLMES: I have a few questions in re-examination. If it's convenient to the Tribunal, I'm happy to do that after the short adjournment.

(12.58 pm)

(The luncheon adjournment)

(2.00 pm)

Re-examination by MR HOLMES

MR HOLMES: Mr Perry, you were asked about BT's contractual requirement that ported traffic collected by means of DLE handover should be segregated. I have a few questions to ask you in that connection.

Firstly, to your knowledge, do links at DLEs between BT and other CPs not relating to ported traffic carry traffic in one direction or in both directions?

A. I understand that they carry it in both directions.

Q. So would both BT and the CP be sending traffic along that link, or would one or other of them be sending traffic along that link?

A. The traffic would be going in both directions, so both would be sending it. It would be CPS, so carrier pre-selection, and indirect access traffic from BT to the CP and from the CP to BT it would be the call termination graphic.

Q. And your evidence, I think, was that there were technical solutions available to address any capacity problems that arise as a result of traffic flowing in both directions; is that right?

A. Yes. The route can be configured to overflow and also you can say which end of the circuit has priority in terms of selecting if there's a -- if both try to send traffic on the same circuit at the same time.

Q. Was that technology available as at 2010?

A. Certainly that technology was available in 2010, yes.

Q. So far as you were aware, are there any difficulties arising from the fact that traffic

flows in both directions?

A. I am not aware of technology difficulties, it's the common approach.

Q. It has been put to you that ported traffic can be handed over by BT as the donor CP at the tandem switch?

A. Correct.

Q. To your knowledge, does BT impose any segregation requirement in relation to the traffic which it hands over at the tandem switch?

A. No.

Q. To your knowledge, do CPs carry the ported and non-ported traffic which they collect at the tandem switch across segregated routes?

A. No, I do not think they do.

MR HOLMES: I am grateful.

THE CHAIRMAN: Thank you very much for your evidence, Mr Perry.

(The witness withdrew)

MR BATES: I just want to raise a point about confidentiality so we can be clear about what is and is not confidential from the CP's point of view. What has become very evident to me from speaking to all of my witnesses is they all have a high degree of knowledge, as perhaps is not surprising, about one another's network request infrastructure. Therefore the basic design of each network's infrastructure, in terms of the extent it is connected with BT's network and where and at which layer, can be treated as not confidential.

Also, the progress that has been made between the CPs in moving to direct routing and the approximate timetable for that, we are also content for that to be treated as non-confidential. I will try and avoid referring to precise percentages and things

like that which might be providing transparency that would not normally be available, but hopefully we will not have to go into that level of detail.

THE CHAIRMAN: Can you please alert me if there's any risk in cross-examination – to you or anybody else -- if there's any risk in cross-examination of confidential material being referred to?

MR BATES: Of course, sir.

MR HOLMES: Sir, I hesitate to interrupt but simply to note that I envisage that the Tribunal might find it helpful as well, for the purposes of preparing a non-confidential judgment, to know clearly what material is and is not regarded as confidential. So it may be -- I do not mean to create unnecessary work for anyone, but it may be that a revised non-confidential version of relevant evidence and submission can be prepared for the Tribunal's benefit.

THE CHAIRMAN: Yes. In effect are you saying, Mr Bates, that parts of your witness statements that are marked as confidential are in fact not confidential.

MR BATES: I am saying that that may be the case certainly in relation to some of the witness statements, and I am not sure that the approach to confidentiality has been entirely consistent between different witness statements. As long as it's the competition lawyers who are doing the redacting, rather than people in the industry who knew what they already know about one another's network infrastructure.

THE CHAIRMAN: So would the best way to proceed be if you alerted the Tribunal, when you propose to treat something that has been marked as confidential as non-confidential?

MR BATES: I think we can proceed on the basis that particular percentages are still confidential. Obviously I will alert the Tribunal as best I can and we will certainly

look at whether there's a way that we can revise some of our confidentiality redacts in the light of what I have said.

If I can also explain what material I propose to put in front of Mr Rosbotham, he is going to be provided with a non-confidential version of his witness statement, so that will be taken out of the confidential file. Apart from that, I have suggested to the usher that we only show him bundles which are non-confidential bundles. Obviously if there are particular documents he needs to see which are confidential that are Vodafone documents, that can be dealt with as and when.

THE CHAIRMAN: Thank you.

MR BATES: I would like to call Mr Rosbotham please.

MR PAUL ANTHONY ROSBOTHAM (sworn)

Examination-in-chief by MR BATES

MR BATES: Are you Paul Anthony Rosbotham?

A. I am.

Q. Did you make a witness statement in these proceedings?

A. Yes, I did.

Q. Do you have a copy of it in front of you, it is the confidential version being handed to you now?

A. Yes, I do.

Q. And that's the witness statement that you made?

A. Yes, it is.

Q. If you turn to the back of that witness statement, is there a signature there?

A. There is and it is mine.

Q. Can you confirm that the contents of this witness statement are true to the best of your knowledge and belief?

A. Yes, I can confirm that.

Q. I would like to give you the opportunity, if I may, to explain to the Tribunal the basic features of Vodafone network infrastructure and also how that affects what Vodafone would need to do in order to avoid ISC.

A. Yes. I am conscious that it's a very technical subject with an awful lot of acronyms, so I will try to keep it at the simplest level as possible. Vodafone, on the fixed network side of things, acquired Cable & Wireless a couple of years ago, which in turn came about from Mercury, which was the duopoly operator with BT in the late 1980s through 1990s.

On our fixed network, we offer a variety of services, mainly aimed at enterprises: large businesses, small businesses, but we are now moving into the residential market.

We operate a mixed estate of TDM switches and IP next generation network switches. Our national interconnect at the moment is predominantly TDM. We are intending, and this is something I should highlight -- it is in the witness statement marked as confidential -- we are intending to migrate to an IP infrastructure totally over the next five years. The only reason that's marked at confidential is that we are communicating that out to our fellow communication providers at the moment and I thought it would be a discourtesy for them to find out from this mechanism, but we now believe we have let enough of them know.

The interconnection with BT is mainly on a TDM basis, to their DLEs. We are connected to the vast majority of BT's DLEs. The connections into the DLEs use

a combination of interband interconnect and IECs purchased from BT and also VICs, which I will no doubt come back to when I am in my evidence.

The capacity is all owned by Vodafone. It carries carrier pre-selection (CPS), IDA, and in the reverse direction geographic terminating traffic to BT and also originating traffic to what are termed non-geographic call services -- that it is 03, 08, 09 numbers -- to our network. That all shares the same capacity which is provided by Vodafone.

We are also connected to BT's tandem layer at the majority of BT's tandem nodes. I think it's fair to say, if we were connecting today we might not have as many connections, but we are in a position where we have got a legacy of different charging arrangements which were applied in the 1990s.

A few years ago BT introduced the VIC capability. I think we have explained that over the last few days, under the VIC capability, physically the calls are routed to and from the tandem layer, but we pay BT as if the calls are being handed over or being collected from the DLE layer. So we pay charges to BT in terms of the port rental and port connection charges as if we connected at the DLEs.

We are in a position now where we have a series of DLEs which are connected solely using VICs, so there's no physical connectivity into the DLE itself, and all of the connections that we have to DLEs use VIC in some form or other, in terms of if we had a physical route that we needed to augment over the last few years, we did so using the VIC capability and that then therefore means that VIC is how the minutes are assessed for charging purposes for the entirety of the traffic.

Q. Since the time when you completed your witness statement, BT filed its reply evidence including a 35-page witness statement from Mr Morden. I want to give

you an opportunity to deal with a number of matters in there, if I may.

A. Yes.

Q. Mr Morden's second witness statement is BT6, tab 2.

THE CHAIRMAN: It might be helpful for the transcribers if you spoke a little more slowly.

A. Of course.

MR BATES: I think it is tab 2, the second witness statement of Mr Morden.

A. Okay.

Q. If I could ask you to look at paragraph 20 please, it starts on page 7 and goes over onto page 8.

A. Yes.

Q. There on page 8 he says that:

> "An RCP can make a sufficiently accurate estimate of call volumes at a DLE on the basis of its knowledge of:
>
> "(a) How many customers they have at a particular DLE, the number of calls it received and consequently the inbound ported traffic to the DLE.
>
> "(b) The average split of OCP calls delivered directly to the DLE rather than the tandem layer from the sample traffic data used to set the APCC."

Is there any comment you wish to make about that?

A. Yes. This isn't a summary which I would agree with. I do agree that we can derive the total amount of inbound traffic associated with numbers that have been ported from a particular DLE. Actually, contrary to what Mr Morden says we do not

actually need to get involved in the number of customers in order to calculate that, we can simply do it by looking at the inbound calls into our network and by looking at the destination number. That tells us where the number used to be hosted, so we can derive that we have a certain volume of calls from a donor DLE. What we do not have however is the amount of traffic and the volume of calls that would use the DLE handover capability were we to purchase that. First of all, the APCC only applies to calls which are originated on providers other than BT. Anything which is originated on BT doesn't come into the APCC calculation. Although BT provide us with a snapshot, once per year, of the total traffic that was originated on their network versus other CP's networks, that doesn't help us when making an assessment for a particular DLE. The reasons for that are in essence what is known in telecoms circles as "community of interest"; people are more likely to make calls to their neighbours than to the other end of the country.

So if I can take a couple of extreme cases, Bracknell in Berkshire is a new town and was cabled up as part of the construction of the new town. It will therefore have a disproportionately high volume of Virgin Media customers versus BT customers. Therefore when you are looking at calls originated to Bracknell numbers, you will see a higher proportion of calls from Virgin Media and from other providers than you will BT when compared to the average.

Likewise, if I take the opposite example, if I was to take say Wick in Scotland, where there is not a huge amount of presence on the part of other providers, the amount of off-net originating traffic to Wick numbers will be very close to 0 and the amount of BT originated traffic will be nearly 100 per cent.

Now, I can make broadbrush assumptions like that, but in order to have accurate

data to actually plan routes, my finger in the air isn't really sufficient. So the second aspect then is that once we have derived the traffic that is coming from CPs other than BT, the DLE handover route would only be used for calls which are delivered to the DLE by the originating operator. Some traffic will be delivered to the tandem unit. Once again, BT provides us with snapshot information on a nationwide basis specific to Vodafone. However, the connectivity to an individual DLE by originating operators will vary dramatically. If you have a DLE in London which is co-located with a tandem unit, there will be lots of originating CPs connected to it, therefore the proportion of traffic which is delivered at the DLE level will be high.

The other extreme, Shetland, Lerwick, has got no originating CPs connected to it, so the amount of BT traffic on that particular DLE -- sorry, the split between tandem and DLE on that particular DLE – will be 100 per cent tandem. Unfortunately, we do not have that breakdown on an individual DLE basis of what that proportion is. BT does, but as a terminating operator, a recipient operator, we do not have that information.

Q. Can I ask you to look, this will have to be in the confidential bundles now, at BT6, tab 11, a Cable & Wireless document. BT bundle 6, tab 11, it's a few pages in, you will see the front page of the --

A. I think it's missing a page.

Q. I think it's BT6, tab 11. It's about 12 pages in. You do not have a confidential bundle? I will just hand up my copy.

MR HOLMES: If you would like a clean copy, I have one here. **(Handed)**.

MR BATES: Turning a few pages in to the document with Cable~ & Wireless

branding --

A. Yes.

Q. -- do you recognise this document?

A. I do, it's a blast from the past, if you like. Yes, I do recognise it.

Q. What was your involvement with this document?

A. This was a document produced as part of the negotiation with BT when they were putting together the DLE handover capability.

Q. Can you turn to the penultimate page of the document please. You were in court earlier when this section was referred to. Can I just confirm there's nothing on this page that Vodafone regards as being confidential, given the amount of time that has passed since the document was prepared?

A. That's the case, it's non-confidential now.

Q. Mr Palmer put it to the Ofcom witness earlier that the contents of this page demonstrated how a CP is in fact able to work out where OCPs are going to deliver calls and take that into account for the CP's investment planning. Do you have any comments to make about that?

A. I am afraid that counsel has taken this document out of context in making that assertion. Within this document it does indeed say that as a broadbrush exercise you could take the numbers on a nationwide basis for BT origination versus other CP origination and also for the splits between DLE and tandem.

However, this document was a proposal for a means of doing DLE handover using our existing connectivity and our existing capacity, not using a dedicated route as proposed by BT. The difference here is, as I mentioned earlier, at DLEs we collect carrier pre-selection indirect access, 03, 08, 09 traffic, and also we send terminating

traffic to BT's geographic numbers over those routes.

If I just look at the traffic to BT's geographic numbers alone, being sent from the Vodafone network through to BT, it is approximately 30 times the level of ported traffic that we are talking about. So if, in this paper, I was discussing adding the ported traffic onto those existing routes, it really was a trivial, on the greater scale of things, amount of traffic that was being added to the route and whether that forecast was accurate to 10 per cent or 20 per cent didn't matter too much.

The situation we have at hand now is where we are being asked to provide dedicated routes purely for that ported traffic. An error in the forecast where it's the dedicated route, and it's therefore a very small route -- in Mr Morden's evidence he is suggesting something which is only 30 circuits in size, so it is the smallest route it is possible to buy, inaccuracies in the forecast where it's a small route will make an awfully big difference, whereas were it being added on this huge shared route, it would not have made that much difference.

Q. Turning back to Mr Morden's second witness statement, you are familiar with the fact that there are various workings that Mr Morden has done in order to show the commercial viability of a DLE handover? Are there any comments you would like to make in relation to those estimates?

A. Yes. There are a few comments that I would make on this, really. First of all, I notice that Mr Morden uses a 10 year amortisation payback period, and also to be more aggressive, a 3 year. For Vodafone, dependent --

THE CHAIRMAN: Sorry to interrupt, it would be helpful if you could flag up which parts of your statement you are referring to.

A. Yes, of course. Mr Morden's witness statement, which is BT6, tab 2, in table 3 on

page 10, he uses a 10 year amortisation period of the payback.

MR BATES: Can I just interrupt that; is the period that Vodafone would use confidential?

A. No, and on page 11, table 4 he uses a more aggressive 3 year period. Vodafone would expect on investment of this type to get a return over a 2 year period. The reason for that is firstly, as I have already outlined, we are currently replacing our TDM network with IP so therefore any investment we need on the TDM network needs to make a rapid return.

Secondly, in terms of the information provided by BT, they give us information via something called the NIPP on planned changes to their network so we know what's going on in the next year to two, maybe two and a half years. We do not have greater visibility beyond that other than public statements made by BT that they intend to replace all of their DLEs by 2025.

That was the first issue.

The second issue, which I believe the witnesses this morning have discussed, was the level of -- although this gives a reasonable explanation of the cost at the BT end of the link, therefore the charges that they would levy to Vodafone, it doesn't take any account of the charges -- of the costs that we incur ourselves.

These can be split into basically three categories. Firstly, we have the transmission side of things, of which there was some discussion, whereby we would have to provision an extra 2 megabit E1 link on the transmission side of things. Because we tend to use our own fibres, the fibre itself is already there but we have got the action of bringing up extra ports on that transmission.

Secondly, adding a port onto the DLE, by Mr Morden's admission with his break

even points, removes a limited amount of traffic from the tandem layer and in general that would not be sufficient to actually cease any ports at the tandem layer. Therefore, at our end of the link we need to connect to a switch port in our network which has got an associated cost.

The third item, which has not been mentioned really in any other earlier witness evidence, is the operational cost of actually running this DLE handover capability. Vodafone is fairly unique, I think, in making extensive use of VICs. Pretty much all our interconnect capacity is using the virtual interconnect capability. The way that VICs work, we manage the level of capacity needed based upon taking the minutes that we see from our billing systems, the total across a month, and comparing it with agreed table that we have with BT for a given route size, which can carry a given amount of traffic, a given number of minutes per month. Compare that with managing a physical route, and a non-VIC type arrangement. In order to manage the route, what you are doing is looking at your network management elements, looking at the actual erlangs as they are known, its occupied circuits on the route over the month and how often it's overflowing from those physical circuits onto another route, and then upgrading the size of the route as necessary.

Both of those are equally valid processes but they are very different. Vodafone, as it moved to using VICs, our entire operational model is around the former of those processes and we do not have that same situation of managing individual links to DLEs in the way that you would do if you were using the physical capability. So therefore, within the cost to me I also need to factor in the head count cost of actually managing this route, and that seems to have been omitted from

Mr Morden's analysis in total.

To be fair, I would expect it to be omitted because he can have no knowledge of the costs of Vodafone running its network.

PROFESSOR REID: It would be useful if you could say what you mean by the words "head count"?

A. In terms of the number of people in our planning teams.

PROFESSOR REID: Thank you. So that would mean, for example, an imputed payroll cost?

MR BATES: You heard Mr Morden say the reason why a 10 year period was used in his analysis was that 10 years is the period during which a CP can obtain a refund of the circuit connection charge. Do you any comments on that?

A. Yes I do, and I believe this is already been accepted, there was a implication in the statement that the refund was in some way linear. In fact, if you cancel within year 1, the maximum refund you can get is, by my calculation, about 42 per cent of the total connection charge and it drops down to 0 over those 10 years.

So really, taking the extreme case of the DLE disappearing after two or three years, the amount that you would get back would be a trivial amount so you would really want to have had the payback within that period.

Q. What visibility do you have of the savings that Vodafone could make by investing in DLE handover and therefore paying the group 5 charges, rather than other group charges?

A. Very little. As has been explained, BT supplies us with a spreadsheet once per year.

This spreadsheet contains the total cost associated with each group that are being caused by Vodafone and the total number of minutes which have made those costs

be incurred. As it happens, might I add that we have not had that spreadsheet this year and BT have failed to provide it to us.

Using the 2015 spreadsheet for example, if I look at group 5, because we do not use the DLE handover capability what I have is a row of zeros for the costs and a row of zeros for the minutes, therefore I cannot derive a price that BT would charge for that particular group. I can potentially do some guesswork based upon looking at the type of material that Mr Perry alluded to in the carrier price list for various LTC charges, but it would be nothing more than guesswork. I do not know for sure, having deployed the DLE handover capability, what BT would charge me.

Q. How does that lack of visibility impact on your ability to build a business case for DLE handover?

A. So in totality, what we are being asked to do here is take an unknown benefit in terms of a pence-per-minute charge and combine it with an unknown number of minutes, because we are unable to work out precisely how much minutes would use the capability, multiply them both together in order to get a benefit. That isn't something which will be acceptable to my management in terms of justifying expenditure.

Q. The final question I have for you relates to what Mr Morden said yesterday about the compensation arrangements where the DLE is closed. So this would be after you have already put a handover, a DLE handover in place.

Mr Morden referred, when he was asked about this in re-examination, to the standard interconnect agreement. Just for the Tribunal's note I think that reference is DF20, page 5.

Do you have any comments to make about that, about your ability to obtain

compensation if a DLE was closed?

A. I think this comes to the definition of what is compensation. I believe the clause concerned is something called the systems alteration notice, it's known as SAN in the industry. In that process, should a provider be making changes to its network which affects another provider, they ask for a quote from that operator of what the impact is on them in terms of the changes they need to make to their network and the cost the making those changes. That would cover off the operational cost of making the changes.

What it doesn't do, in the scenario of, for example, having invested in the DLE handover capability, if this occurs prior to you reaching the break-even point, there's no concept in the agreement of them compensating you for the savings you might have made in the future with that connectivity; it's only around the actual cost to you of rearranging your network.

Now, that isn't to say there would never ever be any negotiations on that matter, but the wording of the agreement as it stands does not make provision for consequential damages, if you like.

MR BATES: Thank you very much. If you would like to remain there, there may be further questions for you.

MR PALMER: I am receiving a slew of instructions in response to that evidence, may I take --

THE CHAIRMAN: If you want 5 minutes, yes that's fine.

MR PALMER: May I ask to some instructions on that?

THE CHAIRMAN: Yes, of course.

(2.36 pm)

(A short break)

(3.00 pm)

Cross-examination by MR PALMER

MR PALMER: I am very grateful for that opportunity.

Mr Rosbotham, good afternoon.

A. Good afternoon.

Q. In your witness statement you deal essentially with two main topics. The first relates to direct routing and the second relates to the predictability and otherwise of calls delivered to the DLE and the viability or otherwise of picking those calls up.

I am going to deal first with the direct routing as you do in your witness statement. From paragraph 14 of your witness statement, you provide us with some background on onward routing and you contrast, at 14 and 15, direct routing and how they work.

The first point you make is that onward routing was devised because TDM networks, which were universally used at the time, are ill-suited to direct routing, as you put it. It's right, is it not, that when portability was introduced to the USA, a direct routing model was adopted with a central database lookup?

A. That is correct, but there were some different regulatory and technical reasons why they made that choice to the environment which is used in the UK. If it would be helpful to the panel, I can take you through that.

Q. Just answer my questions in the first instance and if there are additional questions arising, I am sure your own counsel will ask you those.

That direct model in the USA utilised TDM technology, didn't it?

A. Not of the format which is used in the UK, no.

Q. You say the difference between the TDM technology and the United States is material in this context?

A. Yes, it is.

Q. In principle a TDM network is nonetheless capable of intelligent routing to enable direct routing, isn't it?

A. It is indeed capable, it is just ill-suited in terms of doing the necessary database lookup in order to do the direct routing. The processing overhead which it incurs on the originating TDM node in order to look up for every single number what the destination number -- what the destination network is, causes quite considerable processing issues on many TDM switches.

Q. There's no actual technical reason which prevents a direct routing model being adopted on a TDM network with a central database lookup, is there?

A. There is no technical standardisation reason. There are capacity issues in terms of the processing capability of the originating TDM node being insufficient to do so in most cases.

Q. Do you agree with me that whether or not direct routing is deployed on a TDM network, despite the difficulties to which you have referred, will depend on whether the correct commercial incentives are in place?

A. I believe it would be incorrect purely to point to the commercial incentives. There are -- or at least the narrow commercial incentives in the context of APCC avoidance –, there are wider issues in terms of call quality, also wider issues in terms of avoidance of cost on one's own network in terms of gatewaying.

Q. Let's look precisely how you put it in your paragraph 15. The final sentence:

"Making database lookups is expensive on TDM networks."

It's not that it's not possible; it's that it is expensive?

A. I would disagree with that characterisation. The issue is that it uses greater processing capabilities on the originating switch. At a best-case scenario that means that the processor on that switch is more heavily loaded. The worst-case scenario, which is certainly the case for many of my own switches, is that the processing capability required simply is not there.

As we have discussed earlier, you are really talking about 1980s and 1990s technology here, probably the mobile phone in your pocket has got larger processing capabilities than some of these switches. So we will be in the situation, if trying to implement it using TDM networks, of actually having to deploy more nodes in order to get that processing power. However, TDM switches are not something that you can generally buy because, as we have heard over the last couple of days, new networks tend to use IP and NGN technology.

PROFESSOR REID: Could I have a brief word?

THE CHAIRMAN: Yes.

PROFESSOR REID: There does seem to be a bit of a disconnect between the commercial proposition here and the technical proposition. As I understand it: are you saying that essentially the TDM technology is virtually now an obsolete technology and cannot carry the capacity that you would expect in a modern setting?

So whilst it's theoretically possible to have direct routing, empirically it's becoming increasingly difficult because of the volume of traffic going through and that the technology itself is close to becoming obsolete. I am not trying to put words into your mouth, I am trying to summarise what I think you are saying.

A. I think that's pretty much a reasonable characterisation. The technology isn't obsolete insofar as BT continues to operate a TDM network and it works perfectly fine, as does Vodafone. However, you can't go out and buy this equipment any more, it has reached the end of its life from that standpoint.

Whether or not the processing capacity of the TDM switch is exceeded, I would not seek to put words in the mouths of other operators on this, certainly for my own network, the current utilisation is such that, if I tried to do a database lookup on every single call, which is what is necessary, there would not be sufficient capacity there. The overhead versus routing based on the leading digits of the number, which is the normal way of routing, is of the order of about 150 per cent on the processor, the extra loading that's created by it, and we simply do not have that headroom available.

PROFESSOR REID: Sorry to interrupt, but that is helpful, thank you.

MR PALMER: Just going back to why this point arises in the context of your witness statement, which is what I am asking you about. If you look back at your paragraph 14, you say in the final sentence there:

> "Onward routing was devised because time division multiplex networks which were universally used at the time number portability was introduced are ill-suited to direct routing."

So we are talking about the 1990s, then, 1997?

A. 1995.

Q. 1995. That is the period in which we are talking about. The difficulty there is simply one of expense at the end of the day, wasn't it?

A. It was expense in terms of we would have had to deploy extra TDM nodes and at that

time it was actually possible to deploy additional TDM nodes, they were available, they were being rolled out.

Now obviously things are different you could not buy these things, even if you wanted to.

Q. I am just asking you to put that into context. It could have been done, but it would have been expensive?

A. Yes. Basically what you have is a trade off in efficiency in terms of if you use onward routing you have an inefficiency on the calls to ported numbers in that they take this dog-leg via the donor network. In contrast, for direct routing the inefficiency you have is doing a lookup to a database which imposes extra processing on whatever technology you have got, it's just that modern NGN IP technology has got modern processors in it, so therefore you put that additional load on the originating switch. And there is a balancing point there, which will vary according to the technology and according to the volume of numbers which have been ported, about which is the most efficient.

THE CHAIRMAN: Can I ask a question please, Mr Palmer? You have mentioned the need for greater processing capability, I think. Was that something that was equally applicable in 1995, or is that something that has arisen since then?

A. It was probably more applicable in 1995. There have been upgrades to processors in the meantime, but nevertheless TDM switches are probably now using processors the equivalent of what you would have had in your PCs at the turn of the century.

THE CHAIRMAN: Thank you.

MR PALMER: And one of the changes since that time has been that at that time you would have needed, as you described, a central database. That that's no longer the

case.

A. I do not believe that has changed actually, the issue of the database is one of how the information on ported numbers is disseminated. So the concept that was put forward when the UK was looking at moving to direct routing in the 2008 timeframe was that there was a central database which each operator downloaded into their network periodically every few hours, so you would not need a central database.

There are alternatives in terms of each individual operator publishing lists of the ported numbers and exchanging that. That capability was always a possibility, indeed it might have been easier in the 1990s because there weren't many operators around then versus the 300 now. Back at that time there were a limited number of operators, so that bilateral exchange was possibly easier.

Now, there are alternative routing techniques in terms of IP networks that have emerged, certainly I have seen mention of IP redirects, but they still involve the donor network so they are not strictly direct routing.

Q. I see. When it does come down to a matter of expense as to what solution is chosen, what solution is then chosen will depend on the commercial incentives available in that context, won't it?

A. That depends on the manner in which the decision is being taken. If it's an individual operator matter, I agree with you, if it is something which is standardised at a UK level, either via regulation or by a technical standardisation, it is something where the operators collectively come together to form an opinion. So you could argue it's a collective commercial opinion, but it is not an individual one.

Q. That is not necessary that last course, as indeed your own company's actions that you

have described in your witness statement, "With other CPs we have established direct routing", as between yourselves demonstrates?

A. Indeed. As I say, my witness statement outlines the situations where we have been speaking to various operators about implementing direct routing. We have not done that yet because, as I have already described, we are predominantly a TDM network at the moment, we are deploying our IP network as it's an integral part of that network that we intend to direct route, we have secured agreement in principle with a few operators.

Q. I now want to look at the incentives or otherwise to take that course and establish direct routing.

The first point, I assume that you have agreed with Mr Moore, who gives evidence on behalf of Sky, that the commercial benefit of direct routing is reduced APCCs?

A. That is one commercial benefit. There is also another commercial benefit of reduced need for gateways.

Q. Yes. So reduced need for gateways and reduced need for APCCs. They will both feed in to the ultimate bottom line commercial decision as to whether that's going to be a good profitable option for the CP in question?

A. I would highlight that the decision is wider than the narrow commercial, I would actually say the call quality comes into the commercials because the customers demand a certain amount of quality of service and functionality. So therefore that is all part of the commercial mix.

Q. No one's going to suggest to you that quality of service is somehow irrelevant, it obviously place into any cost benefit analysis, but so do APCCs, do they not?

A. They do have some relevance but they are not the sole driver, and possibly not even

the majority driver.

Q. Possibly not the majority driver. You say fairly possibly because that would depend on the CP?

A. Sorry, I am not sure --

Q. You have explained your own current move to a new next generation network, an IP based network, which has qualitative properties associated with it. Others may not be at that precise position that you are in for the moment, moving from TDM to IP and they will be more focused on APCCs, won't they?

A. I disagree. It may be that some operators are focused on APCCs, but my own analysis is that the gateway costs are just as material. Certainly for myself, on my analysis I believe I can reduce the level of gateways that I would need towards BT if I can direct route the traffic which is ultimately going to end up on a IP network by a significant amount, and that would reduce the amount of capital expenditure I need to do on rolling out my new network.

Q. Try to focus on the point. The point is, I have not said that APCCs are the only sole incentive relevant, I have not suggested that, I am not going to suggest that to you. I am going to suggest that in your case the qualitative properties of moving to a new network may be very important; other CPs, to whom that doesn't apply, will be more focused on the commercial incentives which includes APCCs?

A. I can't comment on the incentives of other operators who are competitors to me.

Q. You find it difficult to even assent to that basic proposition, that the commercial result for them will be a significant incentive?

A. I believe the commercial result will be a significant incentive but I can't comment on what their drivers are for assessing the commercial viability.

Q. You do not think you can comment on whether costs to them will be a significant driver?

A. Insofar as I do not know what their other costs are in terms of gateways, I am not in a position to make that comment.

Q. You are not making a comment either way?

A. No.

Q. I see. The call routing of ported calls is determined by the OCP, isn't it?

A. Could you repeat the question?

Q. The call routing of a ported call is determined by the OCP, isn't it?

A. Are we in a direct routing or onward routing scenario here?

Q. Either.

A. Okay, so in an onward routing situation the OCP will determine where to route the call based on the number range. It is perhaps erroneous to consider it as a ported call at that time because it's not until it gets to the donor network that it is recognised as being ported. It is just like any other call at that stage.

Q. The OCP doesn't know?

A. The OCP doesn't know.

Q. It routes it as a normal call, regardless whether it ends up being a ported call or not. It will end up being a ported call, but the OCP determines that route to where it believes the number to be hosted?

A. Right.

Q. On a direct routing basis, the OCP again will determine the route all the way through to the far end of its network?

A. Basically, yes there could use a transit network in which case they delegate that

responsibility on to the transit network. But on the whole, yes.

Q. So there's no technical reason which means that direct routing has to occur on a reciprocal basis, is there?

A. There is no technical reason, however, it makes sense to actually, if I am opening a conversation with for example Sky, it makes sense that if we were discussing direct routing and we are going to be passing lists of ported numbers to one another, to do that on a reciprocal basis.

Q. I am sure that's right, but can you concentrate on my question: there's no technical reason?

A. There's no technical reason.

Q. Thank you. I have already put to you that -- explored with you that – TDM technology can be used in principle for direct routing. Where call routing does occur on a reciprocal basis, an RCP using any network technology could agree to share some of the benefit gained by the reduction in APCC costs with an OCP that introduced direct routing of the RCP's numbers, couldn't it?

A. It could do. The business case for the originating operator in that circumstance would be reduced though, because, as I have outlined, you have the issue of the APCC removal but you also have the issue of removal of gateways as a motive and an incentive to direct route. If the RCP is still using TDM technology, and the originating network is using IP technology, that gateway is not removed therefore a great deal of the benefit of direct routing doesn't occur.

Q. You assessed whether that made commercial sense to you as a CP on the basis of the reduction that you were getting in APCC payments?

A. In that scenario, where there is no gateway removal, you would do it on that basis,

yes.

Q. If you had gateway removal on top of that then you could take that into account too, but without it you do it on the basis of APCC being removed?

A. Indeed.

Q. And there's saving there which at the moment the RCP is the party that pays the APCC, so if it wanted to encourage an OCP into establishing direct routing with it, it could share that benefit with the OCP so that both parties had that incentive?

A. It would pass through part of that reduction, the APCC removal, yes.

Q. The RCP would have to take into account the cost of implementing that direct routing as compared with the savings from reduced APCCs. That's where we get to from that. If there was a saving to be had from reduced APCCs, an operator with TDM technology could still take that decision to direct route, couldn't it?

A. It could do so, yes.

Q. It all depends on the business case in light of the existing technology.

A. Yes.

Q. So it is overly simplistic, isn't it, I respectfully say so, for you to suggest that the decision to direct route relates to whether an operator has IP or TDM technology installed on its network; that's just too simplistic to put it that way, isn't it?

A. The decision on the originating side is broadly driven by IP versus TDM technology. On the recipient side I accept that a TDM recipient could indeed implement direct routing. However, as an originating operator you would be unlikely to get into that negotiation unless you could see it reciprocated for the traffic coming towards your own network, and the TDM network isn't able to do that in the reverse case.

Q. Looking at interworking and gateway costs you have referred to, that is at your

paragraph 21. Let's get back to basics on that to be sure that we more clearly understand what we are talking about. Interworking arises when a call originates on one type of network and terminates on the other?

A. Yes.

Q. It goes through a gateway to do that --

A. Yes.

Q. -- regardless of the traffic type. It doesn't matter if we are talking about ported calls or non-ported calls, that much is true?

A. That's correct.

Q. Of course in the UK we have a mixture of NGN and TDN networks?

A. We do.

Q. And those networks are not fully interconnected, are they?

A. They are not fully connected, however the main traffic sources are connected together. The large operators do tend to be directly connected.

Q. A company such as yours is certainly interconnected with a company such as the other members of the CP group, with BT obviously?

A. To give a metric on this, for my outbound geographic traffic going to operators other than BT, way in excess of 95 per cent of calls go on directly interconnected routes and do not transit via BT.

Q. For an operator of your size, that is to be expected.

A. Yes.

Q. But we have heard about the larger number of smaller operators, beyond networks such as yours, and they are not fully interconnected are they?

A. Indeed they are not.

Q. So, even where an OCP and an RCP agree to direct route, where the RCP has less interconnection with the OCP, than the OCP has with BT, there will still be additional conveyance costs arising that may involve interworking?

A. In principle what you are saying is correct. However, if the originating operator and terminating operator aren't directly connected together, that means they do not have any commercial relationship, so why would they have agreed to be direct routing between themselves, when they have no commercial relationship?

Q. They do not have the direct relationship, but they could still have traffic between them going through transit operators?

A. They do indeed, but the proposition you are putting is that those two operators have agreed to direct route. They can't agree to direct route if they do not have a relationship with each other.

Q. If they have traffic going from one network to another --

A. We are talking about non-ported here, we are not talking about direct routing.

Q. Just take it back a stage, when you have a call from one OCP to an RCP, they have that relationship to that extent, the calls are made from subscribers on one network to subscribers on another network?

A. If there is a transit network between them, there is no commercial relationship between them. The commercial relationship will be between the OCP and the transit network and the transit network will have a relationship --

Q. I understand that, but when such a call is made, the RCP, in the system of onward routing, is still incurring a cost in the form of an APCC; that is right, is it not?

A. Yes, they are.

Q. If they wish to avoid that cost made in respect of that call, they could agree to

establish direct routing with the OCP?

A. Well, the counter of that, I put to you, is in that situation that RCP would not have a communication channel, liaison channel, a negotiation channel with the originating operator because they do not have an interconnection with them.

Q. Are you saying you can't negotiate direct routing with another CP unless you already have a direct relationship with them?

A. I am saying that if I am a recipient operator and I wish an originating operator to direct route to me, that I do not have a commercial relationship with, it's an interesting conversation that I would be approaching them having no agreement with them at all, it's almost making a cold call to ask them would they mind direct routing towards me.

Q. I see, well --

There can be a relationship because of the porting, can't there?

A. If it's, yes, there is the scenario where you have a donor network and recipient network who are not directly connected together. In the case of Vodafone for example, and I accept we may well be the exception, we have very, very few of those type of arrangements the bulk of our arrangements are on direct interconnects.

Q. Just going back to my question please. Where an OCP and RCP agree to direct route, where the RCP has less interconnection with the OCP than the OCP has with BT there will still be a need for additional conveyance costs that may involve interworking.

A. Could you repeat the question please, because it's a quite a complicated call case.

Q. Where an OCP and an RCP agree to direct route and where the RCP has less

interconnection with the OCP then the OCP has with BT, there will still be a need for additional conveyance costs that may involve interworking?

A. Whether any interworking is required will depend upon the technologies concerned.

Q. They may have different technologies on their networks, yes.

A. We have just discussed, that is probably a niche case, where there are different technologies. In terms of additional conveyance, if you are suggesting that the originating operator and recipient do have some connectivity, just not as wide as the connectivity with BT, that is actually the case that we find for most operators who we deal with, and we would use the direct routes between the two.

Q. Right. And to establish direct routing to some degree you remove the need for interworking from a portion of ported traffic.

A. Establishing direct routing certainly removes the need for interworking, yes.

Q. And there's unlikely to be a material impact on overall call quality, is there?

A. If you have direct routing? It would increase call quality. The issue is not one of gatewaying, it's a concentration of gateways, so the originating network gateways to the range holder who then has to pass it to the donor, who passes it on to the recipient, who has to gateway it back and it's the concentration of gateways.

Q. So you have got an OCP and a RCP with some degree of interconnection?

A. Yes.

Q. Only a portion of that traffic will be ported traffic, yes?

A. Yes.

Q. If you, in respect of the ported traffic, establish direct routing, you may get a consequent increase in call quality for those calls if you thereby avoided interworking, yes?

A. Yes.

Q. But that's only true of that portion of ported calls, overall call quality is unlikely to be affected?

A. The non-ported calls would be going on the direct routes between the two operators in any case, so you can't improve something which is already optimised.

Q. So little material impact, in other words?

A. There will be no impact.

Q. We have already discussed that at present we have a mixture of TDM and IP-based networks in the UK which are interconnected to varying degrees. We have agreed, I think, that interworking is required for all traffic which is conveyed across the TDM network to an IP network. So the gateway facilities to provide interworking already exist?

A. Do you mind if I take that point before you carry on?

Q. That's my question; they already exist, those gateways?

A. Not in the case of Vodafone. We are deploying our network now and buying the gateways as we speak.

THE CHAIRMAN: At this point it would be helpful to me if the witness explained the issue of gateways. What are gateways and what problems arise that are relevant to this issue?

A. So let me try to keep this as simple as I can. So a gateway takes either TDM calls and converts them to IP or IP calls and converts them to TDM. In the TDM network there is a normalised way of handling calls, the calls are coded using something called codecs, coder and decoders, so when you have an analogue voice signal, that's converted into 0s and 1s for carriage across the network. So TDM networks

have got a single codec which is used for converting that analogue to digital. IP networks can use a series of codecs according to the choice of the individual operator. So there are codecs which are optimised for use on mobile phones, Skype uses proprietary codecs itself, and there's a series of codecs which are basically a trade off between call quality and the amount of bandwidth that they use in the network.

Whenever you go from IP to TDM you need to convert from whatever codec has been chosen by the operator into the standardised one for TDM, then if you go through another gateway exercise to go back to IP further along, the codec that's chosen may not be the same and you tend to get call quality issues where you have got different codecs using the call path, it can sound a bit Dalek-like at the extreme case, where there's very low bit rate codecs used.

In contrast, if you have a call which is end-to-end IP, the originating and terminating nodes negotiate as part of the call set up which codec is going to be used. So the issue of multiple codecs and call quality suffering tends to disappear. There's also other issues in terms of the signalling which is used in IP networks, which supports a richer feature set than those in plain old telephone service TDM, so if you have got a call which starts as IP and then goes to TDM, those additional feature sets disappear.

THE CHAIRMAN: So this is an issue of conversion where you have interworking between IP and TDM systems?

A. It is, yes. And every time you do that interworking there is a cost implication in term of the gateway equivalent you have to buy. Certainly I can say from my own network, the gateways are the dominant cost in deploying the IP network.

THE CHAIRMAN: Thank you very much. We may have a break: would you like to?

MR PALMER: I am fine now. I am quite happy. I certainly want to finish this point about interworking and direct routing.

Taking this slowly, the gateway facilities to provide -- there are gateways, let's take it away from Vodafone at the moment. We will come back to your specific case in moment, but just looking at the UK CP network as whole, we have TDM networks we have IP networks, where they interconnect they already need gateways, where they interconnect at present there are gateways, yes?

A. There are, yes.

Q. So those gateway facilities to provide interworking already exist, do they not?

A. They do, yes.

Q. Now Vodafone. A particular feature of your network, because you have the legacy of the Cable & Wireless network, which was TDM, you are wanting to move to IP.

At the moment you have both within your network?

A. We do, yes.

Q. And I assume that that means that where they interconnect, those two technologies, even within the Vodafone network you need gateways?

A. We have limited volumes of gateways at the moment, yes.

Q. As you move to solely IP you won't need those gateways any more? The internal ones if you like.

A. We won't, but they are old gateways which are end of life anyway.

Q. So you won't need them?

A. So we will not need them. It's just, if you were about to suggest that they could be redeployed for --

Q. Do not anticipate my next question. It will all take a lot longer if you try to answer my next question before I have asked it.

You won't need those gateways, will you?

A. Actually we will. I am sorry to disappoint you because we will have a certain volume of customers who are still using legacy technology themselves, so they would be --

Q. At the edge of your network?

A. To our retail customers.

Q. I am talking about the internal ones, you won't need them any more?

A. No, they will be reused.

Q. Because there are still other TDM users in the UK at the edge of your IP network, you'll still need gateways there?

A. We will need to deploy gateways, yes.

Q. That's what you talked about earlier when you said as you establish your IP network you are deploying gateways, because as far as you establish your IP network, at the edges, wherever it interconnects with a TDM network, you need a gateway?

A. Yes.

Q. I have understood that?

A. Yes.

Q. I am very glad of that.

Now, where those facilities already exist, the costs to provide them have already been incurred?

A. No, we will be deploying gateways of sufficient capacity.

Q. Answer the question.

A. You mean the ones that are already there that are not being used any more?

Q. Where the gateways already exist, the costs have already been incurred?

A. Yes.

Q. Thank you. Those costs will not be recovered by directly routing some traffic, will they?

A. No, but they are not involved in direct routing of the traffic in any case. The cost of my chair won't be recovered by direct routing of traffic either, it's not relevant to the --

Q. Hold on. Under the onward routing system, calls from one IP network to another IP network may still need to go through -- will still need to go through – gateways if BT is the donor CP, because BT are having a TDM network, are currently being routed from the IP network through the gateway to BT's network, onward routed to the RCP, another gateway back to IP?

A. You are absolutely correct and that is why we are implementing direct routing in the same timeline as we are deploying the network, to avoid having to buy the gateways.

Q. Exactly. Those gateways that -- just take that example that I just gave you, the costs for providing those gateways have already been incurred?

A. You are going to have to rewind a little, I do not understand which gateways you are talking about, we have a set of gateways --

Q. I am beginning to think you are trying to avoid my question. So just concentrate please on the example.

A call from an IP network to another IP network but the call is ported call. It has been ported from BT. And for onward routing, that means to get from one IP network to the other IP network, it has to go through BT which is TDM. Yes?

A. Yes.

Q. So to do that it goes from IP to TDM through a gateway. Yes? At the other end of BT's network it goes through another gateway to get to the RCP's IP network?

A. So in that scenario, the RCP -- if you are treating Vodafone as the originator, if the RCP has already migrated to IP, yes, that gateway has already been deployed. Where Vodafone is the originator we are starting to direct route at the same time as we deploy our IP network, so the gateway hasn't already been deployed because what we have today is a TDM network.

Q. That's not an answer to the question I asked you. Please can you concentrate on the question I ask you.

THE CHAIRMAN: Perhaps I could just ask the question, Mr Palmer. I think -- correct me if I am wrong - but I think all that Mr Palmer is asking is a fairly straightforward question, which is that, on the hypothesis that he has advanced, there requires to be a gateway to get from the originating CP's network to the BT TDM network, and another gateway to get out. And I think all that Mr Palmer is asking is that, if against that context, you go to direct routing, then you have lost and will not be able to recover the costs of these gateways. Is it as simple as that?

MR PALMER: You won't need to go through those gateways any more, nor will you recover the cost of having deployed them?

THE CHAIRMAN: Yes.

A. I can answer that on two points. Firstly, that is not a situation which exists with Vodafone, but notwithstanding that, if the gateway had already been deployed, the gateways firstly could be redeployed for another reason in your network, or also these gateways do have a financial value and can be sold.

THE CHAIRMAN: I will return the ball to you.

A. I would also observe that because a cost is sunk doesn't normally tend to enter into the equation.

MR PALMER: In that context, it's not the case therefore that interworking imposes a material cost penalty going forward, is it?

A. If we didn't direct route we would need to deploy more gateways, therefore it would be a higher cost.

Q. Can I take you to Mr Godfrey's witness statement which you will find in bundle DF1, tab 4, page 60. Do you see figure 9 -- sorry, on page 61, I should have said -- do you see figure 9?

A. I do, yes.

Q. That figure we see represents the fixed network call volumes and mobile to fixed call volumes in terms of billions of minutes. And it is the solid line which is the fixed network call volumes?

A. Yes.

Q. Have you got that? And that runs from 2006 through to 2015. That's the volume of TDM calls falling, isn't it?

A. It is indeed, yes. No, it's the volume of fixed calls falling.

Q. Fixed network calls volume. And as the volume of TDM calls specifically falls, further material investment in interworking equipment to support onward routing is unlikely to be necessary?

A. That for me may well be the case, yes.

Q. Which leaves us with the material driver to CPs for implementing direct routing being the commercial driver which is, as Mr Moore says, the commercial benefit of

reducing APCCs?

A. I disagree.

Q. Because of poor quality issues, is that why you disagree?

A. No, partly because of call quality issues, but mainly that for Vodafone we are lifting out our entire network from TDM to IP and if we do not need to interwork to a TDM donor network, we need less gateways.

The fact that the overall volume is reducing is irrelevant, what matters to us is the amount of volume we have on our network at that time in terms of how many gateways we need to buy.

Q. If we go please to -- I appreciate you are speaking specifically on behalf of Vodafone in giving that answer, can we go to the CP group's skeleton argument.

Paragraph 11, please. Second sentence:

> "Of course higher APCCs would increase the incentive for communication providers, who are more often RCPs than DCPs, to campaign for cross-industry adoption of direct routing."

Do you see that?

A. Yes.

Q. That's the other model of moving to direct routing which we have heard about, to have it cross-industry, all at once, but equally applies, doesn't it, to bilateral agreements to implement direct routing?

A. It does.

Q. Conversely, just as higher APCCs would increase those incentives, it must follow that lower APCCs reduce the incentives for CPs to move to direct routing, do they not?

A. I would agree with you with the word reduce, yes. Not remove, reduce.

Q. The lower the APCC, the fewer situations in which a move to direct routing would be cost effective for both parties?

A. I have not yet, with the APCCs which have been in place, got to the scenario where a relationship justified direct routing before but doesn't do so because of the lower APCCs. So it doesn't remove that incentive together, it reduces the incentive. But not to the extent that we would still not do it.

Q. That is about -- you are making that comment -- when you say "we", you are talking about Vodafone, and in the context of a much larger move to a whole new up-to-date network?

A. Indeed, and I am sure you will ask the same question of my colleagues from Sky and TalkTalk.

Q. I am certainly not going to suggest to you that the only reason Vodafone is moving to a modern network rather than a TDM network is because of APCCs, all right, that's not my case. We can agree that much. But you can see there's a reduction in incentives the lower the APCCs go?

A. The incentives are reduced but they have not been reduced sufficiently that we are not intending to do direct routing, they have not removed the incentives such that we don't want to do it.

Q. Not for you, as Vodafone?

A. For me, as Vodafone. I can't speak for other operators.

Q. Can we move topic, I am going to move to the contestability of ISC. I am all right without a break, but if there were going to be a further break, now would be the time. We are entirely in your hands.

THE CHAIRMAN: How are we doing in terms of time, are we going to finish the

witness today?

MR PALMER: Certainly we are going to finish Mr Rosbotham today. I do not know how much further progress we are going to make, that depends on how quickly Mr Rosbotham can answer my questions. But we will finish Mr Rosbotham today.

THE CHAIRMAN: I think we will have short break.

(3.44 pm)

(A short break)

(3.55 pm)

MR PALMER: Mr Rosbotham, from paragraph 37 of your witness statement onwards, 37 to 40 for the Tribunal's note, you address the question of the ability of CPs to interconnect at the DLE to collect ported traffic. And you have set out there what you consider to be the issues that CPs face in using DLE's handover product, yes?

A. Yes.

Q. At paragraph 37 you explain that Vodafone is connected to every DLE, other than a single one at Lerwick in the Shetland Islands?

A. That's correct, yes.

Q. So, self-evidently CPs can choose which DLEs to interconnect to. Presumably Vodafone doesn't have anything against Lerwick, presumably Vodafone couldn't justify the costs of interconnecting at Lerwick?

A. That is exactly it, it's the cost of putting the fibre across the sea or paying for capacity across the sea to get there.

Q. And in light of anticipated call volumes from Lerwick, and no doubt the Shetlands generally, it's cheaper for Vodafone to purchase a transit product instead presumably?

A. Indeed.

Q. Unsurprisingly, the viability of interconnection will turn on the costs of interconnection and likely call volumes at a particular DLE as against the alternative of purchasing conveyance?

A. Yes, that's correct.

Q. Because of course, to state the obvious, but to be clear, the cost benefit analysis of connecting to Lerwick is entirely different to connecting to a DLE in central London?

A. Indeed.

Q. So what you are saying at paragraph 38b of your witness statement, which is on page 16, is that when Vodafone is assessing the viability of using DLE handover for ported traffic, it must do so on the basis of the costs of deploying a segregated route by reference to anticipated volumes of ported traffic only for a particular DLE?

A. That's right, yes.

Q. And that is on the basis of a 2 megabit per second or 30 voice channel minimum unit of capacity?

A. That's right, yes. I understand BT does offer a 30 circuit, Vodafone itself doesn't use anything less than 60, hence the discrepancy.

Q. Yes, it is your footnote 37 on page 15. I think you say the smallest route size is 60?

A. Yes, I acknowledge I was in error there in terms of what BT would offer.

Q. That is fine, you are happy to acknowledge it's 30.

So Vodafone would assess whether its anticipated volumes of ported traffic at a particular DLE were sufficiently high that the cost of installing that dedicated link

was lower than the ISC would otherwise pay?

A. That's correct, yes.

Q. Vodafone is not going to be concerned with the extent to which capacity at a particular link is utilised, is it, provided that the link is sufficiently utilised that interconnection makes economic sense when compared with the alternative of purchasing ISC?

A. Provided it's past that break even point, yes.

Q. We call it a break even point, that's what matters.

Given firstly that assessment of commercial viability being the bottom line, and secondly, the fact that CPs can choose where to interconnect on a DLE-by-DLE basis, it doesn't make sense, does it, to claim that it's uneconomic for CPs to make use of the DLE handover product at all?

A. It doesn't make sense and it's uneconomic to make use of it at all. Versus the counterfactual of using shared capacity, where it would make more sense -- it would make sense at more locations.

Q. Sorry, I just want to clarify that answer. I think you are saying to me it would be even more attractive if you could share ported and non-ported traffic over the same link, is that right?

A. Yes, indeed.

Q. That is not quite the point I was putting to you. I think you accept that you can't simply take this on an average basis and say it doesn't work on an average basis for all DLEs, you can take it on a DLE-by-DLE basis and you assess the economics by reference to each individual one?

A. I do, yes.

Q. That would equally be true as a matter of principle for non-ported traffic as Lerwick demonstrates?

A. Yes, with the exception that for non-ported traffic because we are able to combine the traffic types on the same route, the break even point is far lower.

Q. Yes. It's the same assessment, it's cost -- yes, exactly. Where the line falls may differ according to whether you are talking about ported or non-ported, but that's the principle that applies.

Sorry, I should correct that, it's not the break even point that changes it's the likelihood of exceeding it?

A. Yes, the break even point would be the same, the likelihood of achieving that break even point is greater if you have more traffic.

Q. The more traffic that could use it?

A. Of course.

Q. Right. VICs. Virtual internet circuits. First point, VICs are the same price as IECs, aren't they?

A. They are, yes.

Q. Therefore, given that the DLE handover requirement for a segregated route exists in any event, the fact that Vodafone can't use VICs places it in no different position to any other CP which would also need to install a segregated link?

A. It doesn't place us in a different position to any other CP who needs to use a different segregated link. It does put us in a very different position in not being able to use VICs, because it affects the cost at our end of the network.

Q. The cost benefit analysis at any given DLE remains the same, doesn't it?

A. No it doesn't. The break even point that Mr Morden calculated in his evidence, as we

went through before, missed out the costs which occur to the communications provider, to the other provider in terms of their own network and their own operational costs.

Q. When you say that, are you referring to the cost that you outlined in answer to Mr Bates' questions?

A. That's right.

Q. Let's have a look at those costs now. I think as you explained to Mr Bates there were three categories of costs with which you were concerned in this context. The first one you described as transmission costs, and if I have understood that correctly, that's the cost of making the adjustment at your end of the transmission link to receive the new stream of ported calls?

A. That's correct, and the cost of carrying it into our network, yes.

Q. That, you explained, would be achieved by a fibre link at your end?

A. Yes.

Q. So we are dealing there with a few adjustments by keyboard, are we not?

A. On the whole, yes.

Q. Minimal cost?

A. I would not go on as far to say minimal, but on the whole it's automated.

Q. A second category of cost that you identified arising from porting onto the DLE. You said porting onto the DLE removes a limited amount of traffic at the tandem layer, therefore you may still need a new connection at your end.

A. That's right yes, it's because you have taken some traffic off the tandem layer. In principle you could reduce the size of the connection that you have got to that tandem layer and therefore remove ports on your own switches. Unfortunately,

that can't really happen because the traffic levels from these DLEs are very low, so there's insufficient traffic removed -- insufficient minutes removed – from the tandem level to allow to us downsize those routes, so we need to put extra ports onto our switches to interface to the DLE.

Q. If we approach that on a general level, it will vary massively according to which DLE you are talking about, will it not?

A. Indeed it will. If you are in the situation where you have a DLE which fills the minimum route size completely, you may be in a situation where you can move a port from the tandem layer. But the more generic case is that it's a limited amount and the removal of those minutes from the tandem layer would not be sufficient to allow you to remove a port from that layer.

Q. It depends how many minutes ultimately?

A. Yes.

Q. So you can't guarantee that you would be able to remove a circuit from the tandem layer, but if the number of ported minutes were high enough, then you could?

A. That's correct.

Q. So at the busiest DLEs it's more likely that you would be able to make that saving and at the less busy ones, it is less likely?

A. It is, yes.

THE CHAIRMAN: Is this about whether the equipment at the tandem layer can be deployed?

A. It's not so much the -- it's equipment which interfaces to the tandem layer. So in the extreme case, where you remove sufficient traffic from the tandem layer by using the DLE handover, you could remove -- you could take the port on our network

that was facing the tandem layer and make it so it's facing the DLE instead.

In the other scenario, which I would contend is more generic, in the other scenario there would be insufficient traffic taken off the tandem layer to allow you to remove those ports, so you have to put an extra port into our network.

THE CHAIRMAN: Thank you.

MR PALMER: The extra port into your network, that is again keyboard work, isn't it?

A. It's a port which has an opportunity cost which can then not be used for other purposes.

Q. The third category of costs that you identify was an operational cost. I think you explained that Vodafone was using VICs, but if you were to take on the DLE handover, that's with a different kind of connection, that would need to be -- the level of capacity needed would have to be managed, those physical non-VIC routes would have to be looked at to see to what extent they are occupied and overflowing, and whether they need to upgrade if necessary.

And what this came down to, as was clarified in answer to a helpful question, was whether -- what you describe as the "head count" cost, so it involves people to do that. Let's just put that in context. We are not talking about a lot of man hours, are we; we are not going to need to hire new engineers to do this?

A. I can't say whether or not we would need new engineers, we run a very lean workforce in this area now so they do not have particular spare time, in all likelihood you would need extra people, but it isn't large numbers of people, I knowledge.

Q. In all likelihood you would need extra people?

A. People.

Q. Have you assessed this at all?

A. No.

Q. Is this is a back of the envelope guess at the moment?

A. No, it's based on, prior to 2010, we were using physical interconnection to all of the DLEs and we have migrated that over to VIC and we have lost head count in that area, probably sub-10 but certainly between 5 and 10 head count since then.

Q. Because you haven't given evidence to the Tribunal as to what a CBA -- cost benefit analysis -- would look like in respect of a DLE, can I put it to you this way, we can't conclude from your evidence, can we, that an RCP must rely on BT to route calls to a tandem node?

A. My evidence doesn't have a cost-benefit analysis in there. Mr Morden has done a cost-benefit analysis which we consider to be flawed, but even in his analysis, for approximately 80 per cent of DLEs, we couldn't use the BT product cost effectively.

Q. Where have you got that 80 per cent from?

A. If we go to BT6 tab 2 table 7. You will have to forgive me, I have only got the blacked out version here, but it is the number of DLEs that break even for use in the DLE handover service, versus 640 DLEs altogether against Vodafone in particular. To be fair, I can't speak for the efficiency of any other operator.

Q. Sorry, the point you are drawing from that table was?

A. Mr Morden concludes that a certain number of DLEs would be cost effective -- would break even for Vodafone.

Q. That's the point you wish to make?

A. Which by definition means the other DLEs would not break even, so for those other

DLEs the business case to use a handover capability doesn't work out, therefore the only option, commercially --

Q. Not the only option, no, because you can go by DLE basis, as we have explored. If you look at the far-right column in that table, which is the percentage of ported minutes collected from the DLE which result in connecting to those DLEs.

A. Unfortunately I have not got the -- I only have the redacted version here.

Q. Perhaps we can write that figure on a piece of paper and hand it up, perhaps Mr Bates can assist with that? We can't show the rest of the table. **(Handed)**.

A. Mm-hm.

Q. That is the material figure, isn't it?

A. That is the material figure using Mr Morden's assumptions, which we have established do not actually align with our own cost assumptions.

Q. We have been through the cost assumptions to the extent which they are going to be material realistically.

Third party transit. First of all, numerous operators offer third party transit of non-ported calls do you agree with that?

A. That's right, yes, including ourselves.

Q. No technical distinction between carrying ported and non-ported traffic?

A. That depends on what you mean by technical distinction. They are routed using circuits in the same way and using leading digits to determine what to do with the call. The processes associated with setting up that routing are quite different between ported and non-ported.

Q. You say at paragraph 41 of your witness statement that any potential third party transit provider must consume the DLE handover product in order to provide the

capability, so the question for a potential transit provider would, in essence, be the same question that we have explored, whether the costs of interconnection, on the basis of segregated link for ported traffic, can be justified by reference to expected demand?

A. It is indeed. If we knew what that expected demand was to be.

Q. It's possible, isn't it, for a wholesale product for ported traffic to be provided by any CP with reasonable level of connection to BT switches?

A. Only if they consume the DLE handover capability, and given adequate traffic forecasts. But my contention would be that we are unable to provide that forecast for them to decide where to invest in DLE handover in the network.

Q. We will come to the forecast in a moment, I know you have made a point about that, and you would need to forecast is the point that you have made, right?

A. Yes.

Q. I will deal with it now in fact. The point you made about the adequacy or otherwise of the forecasts is that individual areas may be served by a different profile of number of CPs -- different number of CPs or profile of those CPs?

A. Both served by and the connectivity to the DLE as well, yes.

Q. Let's just look at that. I do not want to misrepresent your argument, so let's make sure that I have understood it. Your point was that the BT snapshot that was provided as to the balance between DLE and tandem handover is a national picture, specific to a single CP but nationally averaged. And across the nation there is variation. You gave us two examples, Bracknell a new town in particular, with an association with Virgin, and Wick in Scotland, where you said it's 100 percent BT?

A. Could I just correct that just slightly. I would expect there to be variation.

Q. I see.

A. I can't know that there is, because I do not have access to that traffic information.

Q. So because in different areas you will have different numbers of CPs connected, your point is that when you reduce that average figure to a particular DLE area, you do not know how it's going to work out?

A. That's exactly it, yes.

Q. I have answered your point?

A. Yes.

Q. That's a good start. Can I just ask you about that first of all. If you take to hand Mr Morden's second witness statement, you may still have it open, it's in bundle 6, BT6, tab 2, paragraph 21.

Again, bearing in mind what we just saw in table 7, looking at that figure 1, it's the left hand end of that graph which is the most significant for this purpose, isn't it?

A. It is, yes.

Q. How far right you go would vary from CP to CP, no doubt?

A. It does, yes.

Q. But you start from the left hand, ie the DLEs with the most ported traffic going through them, typically urban areas, and of course we are not dealing there with Lerwick?

A. We are certainly not dealing with Lerwick, we have no means to support the numbers there.

Q. In terms of the national average, the national average would generally be representative, those exchanges towards the left-hand side would be generally representative of the national average, there would be particular known exceptions

to that, such as Bracknell and Wick, which non-coincidentally you picked out. But beyond that, which you will know about those exceptions, you can expect those very busy DLEs to be broadly representative of the national average?

A. Can I just highlight that I know about Bracknell because I used to live there a decade ago, otherwise I do not know any of the others, you have the advantage over me in terms of you having access to that traffic information. I can't know for a particular area what the mix of CPs are connected to that DLE.

Q. Are you familiar with Ofcom's review of wholesale broadband access markets 2013; that document?

A. That isn't a market review that I was involved in.

Q. Did you know that that includes a spreadsheet of exchange areas listed specifically by name, giving a market classification on the basis of whether they have less than two principal operators, or more than three principal operators?

A. I believe that analysis has been carried out, but I would highlight that that is particularly targeted at the residential SME market, small to medium enterprise market, where they are on individual lines, and Vodafone is predominantly active in the large enterprise network market. So there may or may not be any correlation between those exchange areas for wholesale access lines versus the numbers that we port.

Q. Vodafone knows where its business customers are?

A. Yes.

Q. You can look at those tables and you can see which CPs are present at those exchanges, can you not?

A. Yes, but that assumes that anybody who is originating the call is doing it in a way that

correlates with that table.

Q. We are here dealing with a matter of fine tuning, are we not, an otherwise broadly reliable estimate as to the amount of traffic through a DLE?

A. No, I would disagree. To give you an example, Vodafone does now provide a residential voice service and we provide that service using BT's wholesale services and we use carrier pre-selection, so we would not register on that table at all even though we are growing our residential volume significantly.

Q. Just turning back to table 7 please, if you still have that folded piece of paper, I do not know if you do?

A. I do not, no.

Q. Perhaps it can be re-provided, folded as before.

THE CHAIRMAN: Mr Palmer, can you remind me where in table 7 this appears?

MR PALMER: On the left-hand side under the column CP there's a number of different CPs listed, the top one is Vodafone. We are looking at that row. The figure I went to before was the final figure in that row, at the extreme right, the percentage of ported minutes collected from that number of DLEs, that number being the number you find two boxes to the left, under, "Number above break even".

THE CHAIRMAN: Thank you.

MR PALMER: So that number, the number above break even, is the total of the number of co-located and non co-located DLEs which come out at break even.

THE CHAIRMAN: Thank you.

MR PALMER: So that, on Mr Morden's figures, is the number of break even DLEs to which Vodafone could connect, and if they did they would cover that percentage of the ported minutes collected from DLEs overall. That's the evidence.

Taking you back to this table now, Mr Rosbotham, to look at that number above break even, that total number above break even.

A. Yes.

Q. That's the number of DLEs out of over 600, 650, whichever it is, which you would have to concentrate on. You know amongst those DLEs where your customers are?

A. We know where our customers are, yes.

Q. Good. And that, combined with information which is available from the WBA market review, would enable you to make a reliable judgment as to where you could profitably and viably connect to a DLE?

A. It's that latter aspect I have an issue with. I do not see how knowing the number of operators who are purchasing wholesale lines from BT allows me to speculate on the level of traffic which will be originated from other operators versus BT, and indeed on the delivery mechanisms used by that originating CP.

MR HOLMES: Sir, I --

MR PALMER: One more question, please.

MR HOLMES: I hesitate to interrupt, but it does relate to this line of questioning, I am sorry.

THE CHAIRMAN: I think we are about to have an objection, so I had better deal with that.

MR HOLMES: It's not an objection and I am sure this is inadvertent, but I want everyone to proceed on the correct factual basis. I have instructions from my client that the reference to the WBA access review, the whole band -- wholesale broadband access review -- is misplaced in this context because it refers to broadband access points and the number of customers at those access points and

they have, I am informed, nothing to do with DLEs.

So I simply wanted to make sure that this line of questioning wasn't being put to the witness on a false basis.

THE CHAIRMAN: Perhaps what I should do, what the Tribunal should do, is to let Mr Palmer proceed but give you an opportunity to cross-examine.

MR HOLMES: Of course. I do not think this can be a contentious point and I doubt it's something that the witness could give evidence upon, it's simply a feature of the relevant Ofcom document and we can produce copies of it.

MR PALMER: The Ofcom document is dealing with broadband, it's not contentious, but where residential customers are buying broadband through those exchanges they are buying voice, aren't they?

MR HOLMES: Sir, my instructions are that WBA relates to access to the customer access line, it has nothing to do with DLEs. For example, there are 5,500 plus access nodes, and at these locations the CP accesses the customer access line. This is a measure of LLU. DLE is limited to 660 points. So it's a different access point under discussion.

I do not know how material it is to this line of cross-examination, I simply do not want the witness to be questioned on a false basis - that, I imagine, will be uncontentious.

MR PALMER: We will explore that further in the final analysis, even if that particular source of information is not suitable, we can see if we can agree, you can just ask BT.

A. I have a cordial working relationship with BT. Unfortunately, number portability is one of the areas where we do not see eye to eye on many issues. The

characterisation that I tend to have of this relationship, and it's borne out -- you will have to forgive me, I do not know the reference, but in the record of the exchanges prior to the dispute -- is that we will ask a question of BT and after four to five weeks we will send another chasing e-mail saying, "Would you mind answering this question?" Then, after about three or four weeks after that they tend to answer with something different.

Against that background, yes I could ask them how much traffic there is from each individual DLE. I think it's a fairly safe bet what the answer would be.

Q. I am sorry, I am not sure I understand that last answer; it's a fairly safe bet what the answer would be?

A. I am almost certain. I can't be certainly clearly, but I am almost certain that BT would refuse to provide this information to me.

Q. That's not the instruction I am receiving.

So if BT did provide that answer to such a question, that would resolve your problem?

A. If BT were able to provide me with a level of traffic from each individual node in their network, subject to APCCs, that would at least allow me to do the traffic analysis in order to assess where connectivity is viable.

Q. The final point to this line of questioning relates to tab 11 of BT6, which you went to in chief, where you were explaining this document, if you remember the context of it.

A. Before you go any further, if I am in the right one, it's removed from this copy.

Q. BT6 is the right bundle to have, do you still have that?

A. Tab 11, document removed.

Q. It's the one that looks like that. **(Indicates)**. You will recognise it.

A. Sorry.

Q. You will recognise it at a glance if you look up.

THE CHAIRMAN: Perhaps I could just intervene at this stage, Mr Rosbotham are you coming back to Monday anyway?

A. Yes.

THE CHAIRMAN: I think, unless it's materially inconvenient, I think the sensible thing would be to break now and resume on Monday morning.

MR PALMER: Yes, I am sorry I said I would finish today and I would not even finish with another 10 minutes. It hasn't made a difference.

(4.30 pm)

(The court adjourned until 10.30 am on Monday, 23rd May 2016)

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