Witness Name: Mark Joseph Jarosz

Statement No.: WITN0481_01

Exhibits: WITN0481_01/1 - WITN0481_01/6

Dated: 9 August 2022

POST OFFICE HORIZON IT INQUIRY

FIRST WITNESS STATEMENT OF MARK JOSEPH JAROSZ

I, MR MARK JOSEPH JAROSZ, will say as follows:

INTRODUCTION

- 1. I am currently a Lead Domain Architect at Fujitsu Services Limited ("Fujitsu"), a position that I have held since August 2017. I am not involved in the Horizon project at present, and have had no involvement in it since 2012.
- 2. This witness statement is made on behalf of Fujitsu to assist the Post Office Horizon IT Inquiry with the matters set out in the Rule 9 Request provided to Fujitsu on 11 March 2022 and a series of follow-up questions provided to me by the Inquiry on 1 July 2022 (the "Request"). It is based on my direct knowledge of relevant matters.
- 3. The topics set out in the Inquiry's Request that I am able to respond to relate to events that took place a long time ago, and more than 22 years ago in many cases. I have addressed, in particular, my involvement in the design and development of the network aspects of the Legacy Horizon system in the period prior to the national rollout, as well as my role as a security architect on Horizon Online in the period 2010

- to 2012. I have tried to remember these events as best I can, but have not always been able to do so.
- 4. Where I have seen documents relevant to the Inquiry's Request for the purpose of preparing this statement or where I have referred to documents, these documents are referred to using references WITN0481_01/1 WITN0481_01/6 and are listed in the index accompanying this statement. To the extent that these documents have not already been provided to the Inquiry, they are exhibited to this statement.

BACKGROUND

- 5. I joined the ICL group in January 1983 and eventually became employed by ICL Pathway Limited ("ICL Pathway"). Prior to that, I worked for a customer of ICL Pathway as a computer programmer for four years. I joined the ICL group as a customer support executive for a range of computers that ICL Pathway sold at the time, though ended up learning about networks from a more experienced colleague on one of the projects that I was working on.
- 6. In most IT systems, there is typically a need for a network solution to provide connectivity between computer systems (servers / workstations) and appliances within and across multiple locations. In the network context, performance modelling predicts a range of network measures informing the selection of components and technology to meet the IT system's required service levels.
- 7. My involvement in the Horizon project began in around 1995, and I remained involved until around 2012. My roles during this period were:
 - a. 1995 1996: Sizing & Performance Consultant
 - b. 1996 2010: Solution Architect Networking

- c. 2010 2012: Solution Architect Security
- 8. I reviewed a slide deck titled 'HNG-X Network Architecture' dated 23 March 2007 (WITN0481_01/1) that I prepared in order to refresh my memory about my roles on the Horizon project.
- 9. For the entire period that I worked on the Horizon project, I was involved in the network aspects of the Horizon system, including those applications that directly utilised the network, with my role changing to mainly cover security from 2010 to 2012. This statement is given on that basis.

THE BID FOR THE HORIZON PROJECT

- 10. As I stated above, my involvement with the Horizon project began in around 1995, around the time the project team was bidding for the project. At the time, people with my background were generally made available to projects on assignment. Once my work completed on a project, my team lead or I would find another assignment for me. I was in the final few weeks of my role on my previous project, and I heard that some colleagues in the same team were starting work on a bid for the Post Office and they needed someone who could do performance modelling.
- 11.I went to ICL Pathway's office in Feltham to meet with the Horizon bid team. My recollection is that the team was Liam Foley, Tony Oppenheim, Dave Cooke, Dave Hollingsworth, and Tony Hayward. Liam Foley was the Sales Director and he managed the team. Tony Oppenheim dealt with the commercials. Dave Hollingsworth was the Chief Architect. I recall that he, Dave Cooke and Tony Hayward were the main people working on the bid documentation.

- 12. When I joined the project, a number of decisions on the Horizon project's networking solution had already been made. I was not involved in these decisions.
 - a. First, it had been decided that the network supporting Horizon would run on ISDN. ISDN is a form of "dial-on-demand" technology. With a "dial on demand" network, a connection is established only when needed. If the Data Centre Router tries to send out data destined for a branch and the connection is off, then the router will automatically establish (hence dial) a connection, send the information, and close the connection when no more data is flowing (an "idle timeout"). Similarly, an appropriate Horizon counter in a branch (specifically, the ISDN card in that counter) will behave in a similar manner in terms of sending traffic. The key advantage of ISDN was its cost effectiveness. The alternative, at the time, was to use "always-on" leased lines, which could cost several thousand pounds a year each.
 - b. Second, it had been decided that a messaging product called Riposte, which had been developed by the Escher Group ("Escher") would be used. A messaging product ensures that information is synchronised across an IT system. In Horizon's case, Riposte carried messages both between Horizon branch counters in the same branch (for instance, about transactions) and between the branch counters and the central data centres in Wigan and Bootle.

- 13. In my first few weeks on the Horizon project, I formed a number of views about the decisions that had been made prior to me joining the Horizon project:
 - a. A fundamental aspect of ISDN technology is that it relies on phone calls as the means of transferring data between the branch and the data centre. This means there could be a risk of too many phone calls occurring at once, causing an overload. However, since most Post Office branch counter transactions were offline (in the sense that they did not require network connectivity to the data centre at the time of being carried out), there would be significantly reduced call volumes and, therefore, lower risk with an ISDN solution.
 - b. The ISDN service was not universal, therefore an alternative network solution was needed for Post Office branches that could not get ISDN service (e.g. in rural areas).
 - c. Comprehensive capacity modelling, which entails analysis of the volume of use that the network may receive (for example, in terms of the number of ISDN calls that might be made, the duration of calls, or the number of concurrent calls), was needed to specify solution components for ISDN call handing to support business volumes and to validate whether ISDN provided sufficient bandwidth for the busiest branches to synchronise transactions. This formed part of my role as a sizing and performance consultant, as I explain at paragraph 15 below.
- 14. Liam Foley generally managed the relationship with Escher. Early in my involvement with the bid, he and I went to a meeting near Gatwick airport to meet Michael Murphy,

the President of Escher at the time. This was really an interview for Escher to decide if they were happy to work with me on the network performance modelling.

- 15.1 was brought onto the bid team as a Sizing and Performance Consultant. Dave Hollingsworth was the Chief Architect of the solution at the time, and I effectively reported into him. The role of a Sizing and Performance Consultant is to do the following:
 - a. Analyse business volumes to determine the capacity and performance requirements that IT services and infrastructure needed to meet (in my case this was in relation to the network aspects of Horizon)
 - b. Create models that predict the performance and capacity of the operational service based on the proposed solution design and the requirements the solution needed to meet, which enables those involved in solution design to test their designs.
 - c. Influence solution component selection and the quantity of equipment required based on the results of modelling, so as to ensure that the predicted performance and capacity of the solution meets the defined targets.
- 16. My initial role was to work with Escher to do performance modelling on Riposte. At the time of the bid, we expected the Horizon solution would be in about 20,000 branches, with an average of two counters per branch, ranging from one counter to 25 counters per branch. All branches had to connect to the Riposte Servers in the data centres to replicate messages. The performance modelling I carried out included working out the number of ISDN circuits each data centre required to operate Riposte effectively. I have reviewed certain documents identified by the Inquiry with URNs

- FUJ00077839, FUJ00077838, FUJ00077942, FUJ00077850, FUJ00077848 and FUJ00058148, however these did not substantively assist me in improving my recollections of this period.
- 17. From my perspective, ICL Pathway had a good and productive working relationship with Escher. We had regular face-to-face meetings with key Escher staff such as Michael Murphy (Escher's Chief Executive Officer) and Andrew Sutherland (Escher's Chief Architect). However, I note that I did not attend all the meetings with Escher, only those that concerned Riposte and that were relevant to my performance modelling work.
- 18. At this initial stage, I did have some concerns about whether the Riposte messaging solution would effectively scale to approximately 20,000 branches, as it had not been proven to work at that scale before. This was not a concern that was unique to me, but was a known issue that was actively discussed within the bid team and with Escher.
- 19. Managing the issue of scaling Riposte was not within my area of responsibility. However, I do recall, from my general involvement on the architecture team, that this concern was eventually addressed in the deployment phase (during and prior to the pilots and rollout of Horizon). Alan Ward, who was the Chief Architect, decided to divide the Post Office branch estate into four equal parts (each having a similar number of branches), with the Gateway counters in each part connected to their own set of Riposte correspondence servers at the data centre. Each of the four parts was known as a "Riposte cluster". This splitting of the Post Office estate therefore addressed the scaling concerns with Riposte. My recollection is that it was decided

that four clusters was suitable, following testing at ICL Pathway's offices in Bracknell.

A performance test rig, known as the Riposte Counter Simulator and which simulated traffic from the estate, was used.

- 20. My role subsequently started to evolve on the project. Instead of just performance modelling, I worked on making sure the network solution we intended to put forward in the bid was actually viable, in the context of meeting performance and capacity requirements (which I had conducted analysis in relation to as explained at paragraph 15(a) above). As I explain in greater detail at paragraphs 20(a) and 20(b) below, instead of only focusing on performance modelling, this entailed also working with vendors and network designers towards the objective of designing a solution that delivered the required performance measures. This work was necessary to demonstrate that the proposed network solution could meet capacity and performance requirements, and that it was capable of delivery and being supported. In my experience, it was standard for work of this nature to be conducted on large scale and bespoke IT project. This work was not carried out because of concerns that the network solution would not be viable. This work involved:
 - a. Working with vendors supplying the network components such as Cisco,
 Eicon Technology, BT, and Energis.
 - b. Understanding the protocols and communication patterns for applications communicating over the network. The main two applications (that is customers for the network) during this period were the Riposte Message Server and Tivoli. I have explained the role of Riposte above. Tivoli was an IBM product used to provide systems management for the overall solution. In the context

of branch networking, Tivoli carried out the following operations on branch counters: software distribution, collection of events / logs and script execution.

- 21. Prior to me joining the bid team, the approach to how Riposte would be used on Horizon had also been decided and this operated as follows:
 - a. There would be a Riposte message server on every Horizon counter. The Riposte message server participates in replication and stores messages locally in a message store.
 - b. In most Post Office branches, there were multiple Horizon counters. If a Riposte message was created on one counter (for instance, because a transaction had occurred on that counter), that message was forwarded to every other counter in the branch. Sometimes, a counter would forward a message but not every other counter might receive it. The counters exchanged "markers" every five or ten seconds. Those markers enabled the counters to detect if another counter has a message on it that it did not have, triggering the relevant message to be resent. In Riposte's terminology, the counters within a single branch were known as "permanent neighbours".
 - c. In a single counter branch, there were two Riposte message servers built into a single Horizon counter. One Riposte message server would write its messages to a permanent hard disk, and the other to a removable hard disk. While I mention this feature here, it was not a part of the design at the time of the bid. This was a later change to the solution (post bid) to address the potential issue of a workstation failure resulting in the potential loss of messages in the event that the Riposte message store on that workstation

contained messages that had not been replicated elsewhere. We referred to this as a single point of failure problem. I note that this solution was not developed in response to an incident at a branch, but rather was identified as a potential issue that needed to be accounted for.

- d. The purpose of this approach was to build resilience. By replicating messages, the system created multiple copies of a message on each message store. In other words, even if one counter was down, all other counters would "know" the messages on the counter that was not functioning.
- e. One of the counters in every branch would be a "gateway node". This was the only counter configured to interact with the central Riposte message servers located in the data centres. The "gateway node" would transfer messages to a server in the data centre. The "gateway node" was fitted with an ISDN network card. This enabled it to access the ISDN network and call the data centre. The card and the software drivers required for it to operate on the Horizon counter were made and developed by a German company called Eicon. The "gateway node" and the data centre were known as "non-permanent neighbours".
- f. Within the "gateway node", there was a parameter called an unconnected broadcast interval. This was set to 15 minutes. Every 15 minutes, the "gateway node" would compare its current "marker" with what it last received from the data centre server. If its marker was different from the last one received from the data centre server, it would then try and connect to the server. In other words, the "gateway node" would determine if it was out of sync with the data centre server and then try to synchronise itself. Additionally, any priority

message created in the branch would result in an attempt to forward the message to all message servers in the specified group, including message servers which must be reached via non-permanent connections (such as the data centre's servers). Priority messages provided a mechanism for enabling online transactions (this would include, for example, foreign benefit payments). The sending of priority messages is immediate to all neighbours, including unconnected non-permanent neighbours, and ahead of replication traffic. This enables counter applications and data centre applications to exchange sequences of messages comprising an online transaction. This would also result in an attempt at synchronisation of the gateway message store.

- g. The same mechanisms (unconnected broadcast interval and priority messages) mentioned above enabled the option to push information down from the data centre to individual branches. This functionality was required to disseminate information available centrally at the data centre but not held at a branch. For example, this functionality supported foreign benefit encashments (where the relevant branch would not hold any data locally about the person claiming the benefit) and enabled reference date distribution (e.g. an update to stamp prices).
- 22.1 did not have any concerns about the use of Riposte in this manner.
- 23. In order to recollect how Riposte operated (as described above), I reviewed a draft Horizon Architecture Overview dated 16 June 2006 (WITN0481_01/2) and extracts of various Riposte API documentation that was included in software releases of Riposte from Escher over the period of my involvement in Horizon (specifically (i) a

"RiposteCreateMessageEx" function summary (WITN0481_01/3), (ii) a "RiposteDefineNode" function summary (WITN0481_01/4), (iii) a "RiposteCreatePriorityMessage" function summary (WITN0481_01/5), and (iv) a "ConfigUnconnectedBroadcastInterval" function summary (WITN0481_01/6)).

- 24. In order for this design to function on the Horizon system, Escher needed to develop new software for use on Riposte.
 - a. At the time, Riposte had only been deployed on "always-on" networks, like the ANPOST one in Ireland. To support the use of the ISDN network, it was necessary for the message server on the "gateway node" to stop communicating for periods, allowing the ISDN line to go idle. It was also necessary to provide a mechanism for restarting communication either to support priority messages or to periodically synchronise message stores with the servers at the central data centre. Escher needed to develop the software to support "non-permanent neighbours" on Riposte. My recollection is that it took about four weeks for Escher to develop the software required. I do not recall when the need for the software was noticed but I do recall it had been discussed for several months before it was developed.
 - b. Escher also needed to develop a binary message store (implemented as one or more disk files) to support the much higher message rates that were expected on Horizon compared to ANPOST. The message store used previously in the ANPOST system was a text file.
- 25. Eicon also needed to develop new software to support the ISDN aspects of the solution. My recollection is that these developments took about six months and the

need for them was noticed during the bid preparation stage. The specific developments required were:

- a. The development of a new "dial on demand" driver. The Horizon counters operated on Windows NT4, which required a desktop icon to be manually clicked for dial-up to the ISDN network to occur. In contrast, with the "dial-on-demand" driver, if the gateway counter tries to send out data destined for the data centres and the ISDN connection is off, the driver will automatically establish a connection, send the information, and close the connection when no more data is flowing (triggering an idle timeout).
- b. The development of a configurable dial plan that would enable the "gateway"
 Horizon counter to call multiple numbers in sequence to connect to the data centre, in case of the failure of a line at the data centre.
- c. The development of a system for logging all ISDN calls, which would provide development and support staff a full record of all ISDN call attempts, whether they succeeded, and their duration.
- 26.As part of the bid process, I also had to undertake work to determine whether the ISDN network solution we were proposing was sufficient to support Riposte. This work was for a similar purpose as that described at paragraph 18 above and entailed the following:
 - a. I prepared a network sizing model. Post Office provided the workload definition for the model. This meant providing us with data on counter transactions per unit of time, by branch size. From Escher, we also got some estimates, based on live data from ANPOST, as to how many messages were

exchanged on the Riposte system there and their sizes. This allowed the model to predict the likely duration of ISDN calls, the number of ISDN lines the data centres would require, and also predict that a single 64 kilobits per second ISDN line was sufficient bandwidth for branches of all sizes. This provided reassurance that the peak hour utilisation of the ISDN lines would be within the thresholds being proposed by the bid team.

- b. I spent some time speaking to staff at BT to determine how reliable ISDN calls
 were, though I do not recall the individuals that I spoke to.
- c. We also had to ensure we had the right technology in place at the data centres so that ISDN calls were answered and terminated successfully. Eicon's initial solutions involved putting ISDN primary rate cards in the data centre servers.
 I suggested using an alternative CISCO technology. The Eicon solution was very bespoke, whereas the CISCO one was an industry standard which would be scalable and supportable.
- 27. As a result of this work, the bid team internally convinced ourselves that the ISDN solution was sufficient.

Bid documentation

28.1 did not directly work on any bid documentation. I provided input on the proposed networking solution to Dave Hollingsworth and he included it in the bid documentation as he thought appropriate. I am aware that in the bid documentation there were sections about the use of ISDN in the solution.

THE INITIAL GO LIVE PILOT

- 29.1 recall the initial go live pilot scheme started in Stroud with about ten branches. I do not recall the date this started or the functions that were trialled, save for those that fell within my area of responsibility (and for which I provide more detail on at paragraphs 30 to 32 below).
- 30. During this pilot, the network infrastructure to support the pilot (such as compact servers, network switches and ISDN routers) was deployed at ICL Pathway's facility in Feltham.
- 31. Riposte messaging did occur over an ISDN network during this pilot. However, the Horizon counters at the branches were always permanently connected to the ISDN network. This was because Escher had not yet developed the "non-permanent neighbour" functionality. Escher was only able to develop either the binary message store or the "non-permanent neighbour" functionality by the time of this pilot, and they were asked to prioritise the "binary message store" development (though I was not involved in making that decision). This was a limitation in the pilot, as Riposte communication was occurring over permanent ISDN calls, which was different from the target solution where intermittent ISDN calls would be used to establish communication between branches and the date centre. However, this was a limitation that was expected.
- 32. I do not recollect any specific problems, whether in my area of expertise or otherwise, that arose during this pilot.

THE 200 - 300 BRANCH PILOTS

- 33. When the project moved into the next phase of pilots, we deployed the "nonpermanent neighbours" technology.
- 34.1 do not recall the date this pilot started or the functions that were trialled outside my area of expertise. I do not recall any problems occurring, whether in my area of expertise or otherwise, during this pilot.

THE PILOT AND ROLLOUT OF NEW RELEASE 2

- 35. My involvement during the period of the New Release 2 pilot ("NR2 pilot") was in scaling the network solution so we could achieve rollout. I do not recall the date on which this pilot started or the functions that were trialled outside my area of expertise.
- 36.Alan Ward became the Chief Architect for the solution around that time and Terry

 Austin became Programme Director. They scaled up the team to prepare for the

 national rollout. I recall a number of people joined my team, including James

 Stinchcombe and Ben Thornton.
- 37.1 recall reporting into Alan Ward, Richard Long (who led Applications) and Ian Honor around the time of the NR2 pilot. I do not recall Ian's role.
- 38. During the pilot, we observed a number of issues as we worked towards scaling the Horizon solution:
 - a. We became concerned about how we were going to back up all the message stores in the data centre, given the volume of messages, and decided to move to EMC external storage. Rather than servers having their own data storage, we connected large storage arrays to the servers. I recall that one of the reasons external storage was selected was because EMC, the vendor which

- provided the storage, provided a backup/recover solution. However, there may have been other reasons as well.
- b. There was a recognition, as was contemplated during the bid stage, that although ISDN was the preferred network solution, ISDN was not available everywhere across the Post Office estate. ISDN had been selected as the preferred network as, in the case of most branches, it would meet Post Office's requirements at the lowest cost. It was cheaper than the alternatives available at the time (which included BT kilo-stream leased lines and the use of the "very small aperture terminal" ("VSAT")) but was predicted to be available and sufficiently reliable at most branches.¹ I recall that there were about 140 branches where we could not use ISDN as the branches were very remote. In those cases, as ISDN was not available, we used VSAT as an alternate means of connection. VSAT is, effectively, a satellite connection and, as with any network solution, its reliability depends on the context in which it is deployed. For instance, VSAT reliability can be affected by inclement weather.
- c. We had concerns around how many outbound calls were made from the data centre by Tivoli, which caused Tivoli to overload the network. Tivoli provided a solution for software distribution and remote command execution effectively an orchestration system. As part of its system management functions, Tivoli needed to communicate with branches. Sometimes, if Tivoli was required to carry out a software distribution to all Post Office branches, it would attempt to make concurrent ISDN calls to every branch in the estate. This exceeded the

¹ While I recall that ISDN was generally cheaper than VSAT or leased lines, I am not able to particularise the specific cost differences between the networks at the time of the Horizon bid.

concurrent call capacity of the ISDN network. Post Office did not require software updates to be delivered simultaneously to all branches and so we developed approaches to configure and control Tivoli. We would schedule Tivoli to run over a number of days or limit the number of branches that would receive an update at once.

- 39.1 recall that there was testing in relation to the network solution during this period at ICL Pathway's Feltham offices, but I do not recall any details about it.
- 40. Beyond the points above, I do not recall the issues that arose during the NR2 pilot.

 However, I believe they were very typical of large scale IT projects of the time. I do not recall any particular issues that contributed to the delay of the NR2 pilot or the rollout of the Horizon system.

HORIZON ONLINE

- 41.I had an ongoing role providing support on various network issues that arose on the Horizon project until around 2010. In 2010, my role changed to "Solution Architect Security", and I focused less on networks and more on the security aspects of the solution.
- 42. As a Security Architect, I recall I primarily supported the Security team (which included Howard Pritchard and Donna Munro) on Payment Card Industry ("PCI") audits. I am and was not an expert on PCI standards. However, my recollection is that these were independent audits of Post Office's payment systems that were required by payment providers (for example, Visa or Mastercard). My role was to support the audit, including by providing material to the third party auditor about the Horizon system's

- security processes. These audits did not directly relate to the design, piloting or rollout of Horizon Online.
- 43. Prior to 2010 and my role as a Security Architect, I was involved in the rollout of new branch routers to Post Office branches (save for those branches where an ISDN connection was not reliably available, which continued to rely on VSAT technology). Slide 7 of WITN0481_01/1 sets out a planned timeline for this rollout. My recollection is that this rollout was a broader refresh of the network technology at Post Office branches and it was not done specifically to enable or support Horizon Online.
- 44. I did not have responsibility for testing the network aspects of the Horizon Online solution, though I am aware, from my general involvement in the project, that testing was carried out prior to the pilots and rollout of Horizon Online to assess the impact of poor quality connections or connectivity failure. I recall there being several test rigs set up which used the same network technology as in the live environment. This would enable testing against characteristics similar to that in place in live service. Given this was not my area of responsibility, I am not aware of the results of these tests or any steps taken as a result of them.
- 45. I do not have any specific recollection about my involvement in the pilots, acceptance and rollout of Horizon Online.

ASSESSMENT OF CERTAIN ASPECTS OF THE HORIZON SYSTEM AND DEVELOPMENT PROCESS

Robustness

- 46. I am aware of the Inquiry's definition of "robustness". I am only able to evaluate the Horizon system's robustness from the perspective of my roles on networking and security, and I note that I had a much more limited involvement in relation to Horizon Online than its predecessor. It was also not my role to design or develop the applications that would have recorded/processed data on Horizon, including in relation to branch accounts. From that perspective, I did not have concerns about the robustness of Horizon, nor was I aware of any.
- 47. While I may occasionally have attended meetings with representatives of the Post Office, it was not generally my role or responsibility, throughout my involvement in the Horizon project, to communicate with the Post Office or the government. As such, I am unable to comment on Post Office's or the government's awareness of any of the issues discussed in my statement.

Interaction between teams

48.1 moved from my initial role on the bid team into roles in the Solution Architecture team, which was responsible for defining the high-level solution and changes, taking account of new requirements.

² Defined by the Inquiry as including: "(a) the accuracy and integrity of the data recorded and processed by the Horizon IT System (b) the extent to which deficiencies in the Horizon IT System were capable of causing and / or caused apparent discrepancies or shortfalls in the branch accounts (c) the ability of the Horizon IT System to identify errors in data and discrepancies or shortfalls in branch accounts and the cause of the same and (d) the ability of the Horizon IT System to continue to operate satisfactorily in the presence of adverse conditions."

- 49. As noted at paragraph 11 above, the bid team was a single small group of individuals and there was limited need for us to routinely interact with a wider set of teams.
- 50. My overall recollection from my involvement on the Solution Architecture team was of regular and productive interaction with the other teams working on the project (e.g. the Design, Development, Test, and Operational teams), and that our interaction between teams was generally sufficient to resolve any issues that arose. This was helped by a number of the teams being located in the same building, initially at ICL Pathway's office in Feltham, and then Bracknell.

Statement of Truth

I believe the content of this statement to be true.

Signed

Dated: _

9/8/2022

INDEX TO FIRST WITNESS STATEMENT OF MARK JOSEPH JAROSZ

Exhibit Number	Description	Date	Control Number	URN
WITN0481 01/1	Slide deck titled "HNG- X Network Architecture"	23 March 2007	POINQ0104389F	FUJ00098218
WITN0481 01/2	Horizon Architecture Overview	16 June 2006	POINQ0104388F	FUJ00098217
WITN0481 01/3	"RiposteCreateMessag eEx" function summary	Undated	POINQ0104391F	FUJ00098220
WITN0481 01/4	"RiposteDefineNode" function summary	Undated	POINQ0104393F	FUJ00098222
WITN0481 01/5	"RiposteCreatePriority Message" function summary	Undated	POINQ0104392F	FUJ00098221
WITN0481 01/6	"UnconnectedBroadca stInterval" function summary	Undated	POINQ0104390F	FUJ00098219