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Horizon Issue Management – Incident Report & Status Update

Date incident first raised: 27 November 2018	Incident raised by: Fujitsu
Date incident closed:	Incident closure authorised by:

Incident detail reported/overview	Incident INC1742274/PC0275532 was raised by ATOS (26-Nov) for branch 236855 reporting a discrepancy that has appears overnight. It was passed to the SSC on 27-Nov. It seems that following TP/BP rollover some transactions have recorded in the old TP/BP and so will not appear on the branch accounts, although they will be successfully sent to back end systems

Horizon Issue Management Core Group	**Job Title**	**Group Role**
Mick Mitchell	IT Security and Service Director	Manage relationship and service obligations with POL IT/ Systems suppliers
Julie Thomas	Network Operations Director	**Chair**. Operational impact on branches, customers and clients. EUM Programme Director
Rodric Williams	Head of Legal - Dispute Resolution & Brand	Legal & contractual implication considerations for postmasters/agents, clients and customers

Other Group Attendees	**Job Title**	**Group Role**
Steve Bansal	Senior Service Delivery Manager	Fujitsu. Root cause analysis, system monitoring and technical resolution.
Pete Newsome	Post office Account Manager	Fujitsu – Post Office account manager
Angela Van Den Bogerd	Business Improvement Director	Legal & contractual implication considerations for postmasters/agents, clients and customers
Shaun Turner	Enhanced User Management Product Owner	Smart ID solution expert and change implementation.
Martin Godbold	Head of IT Service (Retail)	Manage relationship and service obligations with POL IT/ Systems suppliers
Esther Harvey	Enhanced User Management Programme Manager	Implementation of the improved solution for Enhanced User Management

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Background	Enhanced User Management (known as Smart ID in branch network) has been introduced to ensure all Horizon users are both vetted and have the necessary training to transact regulated products. Part of the EUM technical delivery was a Concurrent Login functionality, which was to permit additional branch operations flexibility in a compliant manner, which was delivered into the Post Office branch network as part of the 17.73 release into pilot in July and rolled out the rest of the network in August 2018. This functionality is only live in Smart ID enabled branches c. 10600 branches. In summary the Concurrent Login functionality: • Allowed a user to be logged in at multiple Horizon terminals providing only one of those terminals was in an 'active state', the rest having to be in a locked state • In cases where a user proceeds with a login any other terminals that they are logged in at that time are in an 'active state' (unlocked) will have their sessions terminated • Screen messaging to advise a user upon logging into Horizon that they have unlocked sessions on other terminals and giving them the option to abort the login and go lock/logout of the other terminals • Breaking out the lock button which had previously been combined with Suspend/Resume, so that it was easier for branches to lock an Horizon terminal The Concurrent Login functionality controls were applied at a user's Smart ID level. Horizon User IDs (HUID) which are the credentials used to login to the Horizon system all have to be set up linked to a Smart ID. For example, if a user's Smart ID is ABCD, they could have Horizon User IDs of ABCD01, ABCD02 etc. set up in the branch. The Concurrent Login functionality controls recognize a user at the Smart ID level, which means, in the example given, ABCD01 and ABCD02 could not have active Horizon sessions at the same time. Prior to Concurrent Login functionality it was not possible for the same HUID to be logged in at more than one terminal at all (regardless of lock status). In pre-Smart ID branches user's wishing to login to more than one terminal would simply have more than one HUID set up to achieve that purpose. The capability for the same HUID to be logged in at on multiple counters, albeit with only one of those logins being active at any one time, therefore changed Horizon user session management at the counter.

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What's the issue?	Pre-Smart ID, a single Horizon user could only be logged in once at any one point in time. If the Horizon user attempted to login concurrently on a second counter, then a "concurrent login" message is output and Horizon will forcibly terminate the previous user session. The change was to allow a given EUM user to lock a counter and then log on to another counter. The user can later lock or log off from this counter and eventually resume the user session on the original counter. There can be multiple sessions in a locked state, but only one user session actually active at any point in time. This has caused incidents to occur in the live estate (e.g. PC0275532, PC0275563) if the active user session rolls over the current stock unit, and a locked session on another counter attached to the same stock unit is then resumed. This is because when the locked user session is resumed the counter is not aware of the rollover and continues to trade in the old trading period (TP) / balance period (BP). These transactions are then recorded in the old TP/BP and so will not appear on the branch accounts, although they will be successfully sent to back end systems, and will be visible in the counter transaction log for the old TP/BP. Further, if the branch is rolled over on the resumed counter, then a non-zero trading position will result and carried forward suspense figures may be incorrect. Investigation has shown that there are other scenarios that may be misleading but none of these have been found to lead to balancing errors. As of 22 Jan 19 this has impacted 19 branches to date over a 6 month period.
Impact [include *number of branches impacted and the detail of the impact*]	Branch: As of 22/1/19 19 branches are impacted. Impacts are: • Confusion for the user • Transactions accounted for against the wrong BP/TP • Calls into contact centres from users/branches impacted • Remedial action required by POL to resolve cases
	Client: None
	Customer: None
Financial/Accounting Impact	Branch: Balancing status of the branch will need to be corrected.
	Client: None
	Customer: None

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<table>
<tr><td rowspan="3">BAU impact</td><td>Contact centres (NBSC/HRSC): minimal impact due to low level of incidents.</td></tr>
<tr><td>Live service desk: minimal impact due to low level of incidents.</td></tr>
<tr><td>Finance Service centre: minimal impact due to low level of incidents. Transaction correction team are contacting branches to ensure accounts balance.</td></tr>
<tr><td>Investigation by Fujitsu

Root cause analysis
[to be completed in detail before agreeing long term resolution]</td><td>
As per Fujitsu:

Glossary
<table>
<tr><td>SU - Stock Unit. Effectively holds some cash and stock for transacting in the branch. Each Stock Unit is balanced separately. Stock units can be for an individual user or shared among multiple users.</td></tr>
<tr><td>TP – Trading Period. Each Branch has 12 Trading Periods per year one each 4 or 5 weeks. Each branch must balance all their stock and cash and send the report to the Post Office.</td></tr>
<tr><td>BP – Balance Period. These are balances inside of a TP. A branch usually does 1 of these per week, so 4 or 5 per month. However they can do up to 99 if they wish. Some offices choose to just have the 1 BP. These reports are not sent to the Post Office.</td></tr>
<tr><td>BRSS – Branch Support Database. This is a single node Oracle database. The Support database stores the same transactions as the live Branch database but holds them for longer, this allowed us to investigate branches that had BP/TP rollovers from 01-Aug.</td></tr>
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Incident INC1742274/PC0275532 was raised by ATOS (26-Nov) for branch 236855 reporting a discrepancy that appears overnight. It was passed to the SSC on 27-Nov.

From the incident it was identified that:

The spreadsheet showing the cash declarations lists a £3712.41 cash declaration at 17:13 on 14/11/2018 with a £0.40 discrepancy. However, a cash declaration made for the same amount the next day at 14:33 results in a -£166.46 discrepancy. This is despite there having been no cash effecting transactions entered on the system between these two declarations.
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	Having investigated further it would appear that a user has been able to transact transactions within stock unit CC in TP8 BP2 despite that stock unit having already been rolled into TP8 BP3. As a result, although the transactions have been recorded in the session data table on the branch database they are not being picked up by the rollover process as the balance period in which they have been transacted has already been dealt with. As a result discrepancies are being reported in cash and stock. Following this we sent the call for investigation to development and cloned it (PC0275565) to begin an investigation of the size of the issue across the estate. Using the BRSS we were able to look at each stock unit rollover and then check for transactions in the previous BP or TP following this. We identified 10 branches that showed the same symptoms: MAC (Horizon incident management team) confirmed that they had been no incident tickets raised for these other branches. Looking at each of the identified branches we could see the pattern of the user performing a temporary lock on one counter, perform the rollover, then switch back and continue transacting in the wrong BP as described above. We extracted all the transactions for the wrong BP on branch 236855 and totalled the cash movement and it matched their discrepancy. We have alerted the branch that raised the original ticket to the cause of their discrepancy but have not yet gone into the detail for the cause. No clients or customers will be affected as the transactions have gone through the system correctly, however these transactions are just not visible to the branch for balancing. To correct these branches we will need to supply the Post Office with a list of transactions affected such that they can correct the branch using standard business processes. Most branches have already balanced again and therefore there is no point looking to make any correction to the data. Further investigation has highlighted a number of scenarios where there is the potential for issues in a concurrent logon scenario:

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	An Unlocked Counter Is Not Aware Of Stock Unit Rollover Scenario: a. An EUM user locks counter A. b. The same HUID logs into counter B. c. Counter B rolls over the stock unit. d. Counter B is locked or logged off. e. The same user unlocks counter A. Now counter A is not aware that the stock unit has rolled over, and will now trade in the old TP/BP, until it logs out. A variant of this scenario is that counter A times out due to inactivity, rather than being unlocked, after counter B has rolled over. Since timeout auto settles any items in the basket to cash, in this scenario any items in the basket would be settled in the old TP/BP. Another variant of this scenario is that counter A may attempt to rollover the stock unit after counter B has already rolled it over. This eventually leads to MSG31314 "The stock unit <su> TP or BP is inconsistent. Balancing cannot continue" and rollover is aborted, however misleading trial and final reports may have been produced prior to this message. Another variant of this scenario is that counter A may attempt to rollover the branch after counter B has rolled over the stock unit into the next TP. This causes a non-zero trading position to be reported and the trading statement produced is incorrect (notably the Carried Forward cash position is identical to the Brought Forward cash position). The only financial figures written by the branch rollover process are the branch suspense opening balances for the trading period rolled into, which may be incorrect if a non-zero net value is present in suspense. **A Second Counter Removes The SU Balancing Lock** Scenario: a. An EUM user logs in to counter A. b. The user presses the button to balance the stock unit. c. The stock unit is locked for balancing. d. The balancing process is started.

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	e. The user locks the counter. f. The same EUM HUID user logs in to counter B. g. This unlocks the stock unit for balancing since the user is the same as the locking user. h. Any user may trade in the stock unit since it is not locked for balancing. i. The current user rolls over the stock unit. j. The user locks or logs out from Counter B. k. The user unlocks counter A. l. The user resumes stock unit balancing. Investigation shows that this causes a system error message and fails the stock unit rollover because the system detects the stock unit is no longer locked. Note however that the system error is not output until the end of the rollover process, and so: i) A balance report is printed prior to the rollover failure. ii) The financial position reported by the rollover process, including declarations, discrepancies and making good local suspense may not be based on the latest position in the stock unit. Note that if a user with a different HUID (even if linked to the same POID) attempts to login while the first session in the above scenario is locked, they are correctly unable to login since the rollover lock present. Another variant of this scenarios is if counter B was initially logged in with the same HUID, but locked. Then at step f above the user unlocks counter B rather than logged in to counter B. **Branch Balancing** **A Second Counter Removes the Branch Balancing Lock** Consider the scenario: a. An EUM user logs in to counter A. b. The user presses the Trading Statement button to balance the branch. c. The branch is locked. d. The branch balancing process is started. e. The user locks the counter. f. The same HUID user logs in to counter B.

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	g. This unlocks the branch since the user is the same as the locking user. h. The user rolls over the branch into a new trading period. i. The user locks or logs out from Counter B. j. The user unlocks counter A. k. The user resumes branch balancing. Investigation shows that this fails because the system detects the branch is not locked. Note that the failure does not occur until the end of the branch rollover process, and: i) The counter does not report failure to the clerk, but rather reports successful rollover into the next trading period, even though the rollover actually failed. This has been raised as defect PC0275644. ii) An invalid branch trading statement is printed prior to the rollover failure. Note that if a user with a different HUID (even if linked to the same POID) logs in while the first session in the above scenario is locked, they are correctly unable to rollover the branch since the branch rollover lock is present. Another variant of this scenarios is if counter B was initially logged in with the same HUID, but locked. Then at step f above the user unlocks counter B rather than logged in to counter B. **Stock Unit Attachment** If the clerk has changed the stock unit that their HUID is attached to on counter B, and then unlocks counter A, counter A is still thinks that the user is attached to the old stock unit, and continues to trade in the old stock unit. The existing code prevents a user's stock unit attachment being changed if that user is currently logged on, but does not prevent it being changed if the user in question is the user making the change. Unlock can cause problems if the TP, BP or stock unit were changed while the counter was locked by the same HUID logged in at another node. Even though these issues will be solved, an independent check should be made that the values in use by the counter match those known to the data centre.

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	Inactivity Auto Settlement The same issued described above also applies when the counter times out the lock screen due to inactivity and auto-settles the basket to cash.
Immediate fix/short term resolution options	**Recommended Option**: • Monitoring and altering implemented to identify branches where this issue has occurred. • Branch contact initiated where the monitoring identifies a user has rolled over a stock unit, whilst logged on at a second terminal. • Communication to the entire Smart ID network, to tell them not to balance stock units whist logged onto other terminals using the same Horizon ID. Pros: • Due to minimal number of branches impacted, and swift alerting it was felt this could be managed operationally, whilst a cohesive solution was implemented. • Minimal impact on the majority of network. • This does not stop branches from being logged on to a second terminal (with the same ID
	Alternative Options: • Disable the concurrent logon capability • Disable the ability for the same Horizon ID to be logged onto more than one counter at once. Pros: • Speed of implementation. These changes could be implemented rapidly, as they are data centre changes rather than requiring a counter release. • Disabling the concurrent logon capability would prevent branches making this error. Cons: • The lock button capability was introduced to provide branches more flexibility in being able to manage their branch. Significant impact on operations if the lock button was withdrawn in most branches (apart from 1 terminal branches). • Complex communication message for both solutions to explain why it was being implemented. Potential to drive significant number of queries into branches.
Long term resolution options	**Recommended Option(s):** To implement the following changes: • Prevent stock unit balancing being started if the same EUM HUID is logged on at another node, even if that other session is locked.

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	• Add a new check to see if the stock unit is locked by the HUID that is logging in, and that HUID is linked to a POID, and there is an ACTIVE or RECOVERING session present for that HUID on another node. In this case do not unlock the stock unit, but display new message MSGNEW01 warning that the stock unit is locked for balancing, and to continue then all other sessions for this HUID will be terminated (there should normally only be the one session for the same HUID on another node that started the balance). • Add a new check for the case where a user attempts to login, and the branch is locked for balancing by that HUID linked to a POID, and there is an ACTIVE session present for that HUID on another node. In this case display a new message warning MSGNEW02 (see section 5.1.3) that the branch is locked for balancing, and to continue and unlock the branch then all other sessions for this user (HUID) will be terminated. • Add a new check when Branch Balancing is started to check if the branch is locked for balancing by that HUID linked to a POID, and there is an ACTIVE session present for that HUID on another node. In this case an error message should be displayed and the user returned to the menu. • Add a new check when Branch Balancing is started to check if the branch is locked for balancing by that HUID linked to a POID, and there is an ACTIVE session present for that HUID on another node. In this case an error message should be displayed and the user returned to the menu. • Present a warning message when attempting to change the stock unit that a user is attached to, if that user is a POID user, and the attachment being changed is for the current user's HUID, and other ACTIVE or RECOVERING sessions for that user are found. If the user opts to continue then terminate the other sessions. • Add a new check for when a counter is unlocked, to ensure that the current TP and BP and stock unit are those that the counter has cached in memory. If they are different then a system error should be generated and the counter force logged out without further interaction with the data centre. Any items in the basket will be handled by recovered as usual. • The TP, BP, and SU checks described also needs to be applied if the system times out at the lock screen and attempts to auto-settle because one or more items are in the basket. Pros: • This will fix the issue, and will ensure branches are unable to perform certain back office functions whilst logged onto a second terminal. • This will ensure that appropriate system checks are in place when counters are unlocks. • These solutions will continue to work where a branches has crashed. Cons: • Length of time to implement, as this requires Fujitsu development, testing and a counter release with Computacentre.

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	• Cost to implement.
	Alternative Options: • Disable the lock button if the counter is in the back office menu. This would stop issues related to removing stock unit or branch balancing locks. • Disable the back office menu if a counter finds at login that the user has a locked session on another counter. This would stop issues related to changing the state of a user or stock unit when the locked counter is later unlocked • Ensure that the new BP/TP is recognised when the user unlocks Counter B, thereby accruing any transaction done in that session flow into the correct accounting period. • To disallow a user's attached stock unit from being changed if that same HUID has an ACTIVE or RECOVERING session on another node (which would be locked). The problem with this is that if the locked counter failed then the user would not be able to unlock the counter to close down the session. • When attempting to change the attachment, to give a warning message, but allow the user to continue. When unlocking a counter, or on inactivity time-out, if the attached stock unit does not match that currently known to the counter, then give an error and force logout the user. Pros: • Speed of implementation. These changes could be implemented rapidly, as they are data centre changes rather than requiring a counter release. • Disabling the concurrent logon capability would prevent branches making this error. Cons: • The lock button capability was introduced to provide branches more flexibility in being able to manage their branch. Significant impact on operations if the lock button was withdrawn in most branches (apart from 1 terminal branches). • Complex communication message for both solutions to explain why it was being implemented. Potential to drive significant number of queries into branches. • Issues where terminals crash and need to be recovered. Or where the terminal has forced logged out due to period of inactivity

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Date	Communication with affected branches
From 6th Dec 2018	Ongoing communication direct to individual branches by Transaction Correction team, where this occurs, to correct the state of the branch account
Date	**Wider Communication**
w/c 14 Jan	Updated quick reference guide issues to branches with reminder included. Covering email to include pointer to the new tip regarding stock unit rollover. Message to be emailed to all branches on Smart ID.

Date	Status Update	Completed by
4/12/18	Initial escalation meeting. Clarification of issue by Fujitsu and impact on branches.	Esther Harvey
5/12/18	Initial technical discussion to understand the issue from a systems perspective.	Esther Harvey
6/12/18	Progress call, to discuss further the impact and potential initial solutions	Esther Harvey
10/12/18	Progress call, detailed discussion on options. Decision to have detailed technical workshop to progress defining potential solutions	Esther Harvey
12/12/18	Technical workshop. Walkthrough of issue in detail from technical perspective to understand why it is occurring. Investigation into what other scenarios could occur. Discussion of options for resolution	Esther Harvey
13/12/18	Progress call, to talk through the output of the technical workshop and further occurrences.	Esther Harvey
14/12/18	Business requirements review workshop, to review first draft of solutions and what Post Office requirements are.	Esther Harvey
17/12/18	Requirements play back meeting to Fujitsu.	Esther Harvey
18/12/18	Progress call, to review if there were any further instances and update on technical solutions	Esther Harvey
20/12/18	Progress call, to review if there were any further instances and update on technical solutions – finalisation of business requirements discussed and desired solution discussed.	Esther Harvey
21/12/18	Formal change request raised to Fujitsu with business requirements.	Esther Harvey
2/1/19	Progress call, to review instances since before Christmas, it was quiet over Christmas. Update on technical solution design by Fujitsu.	Esther Harvey
9/1/19	Business requirements clarification workshop with Fujitsu, to resolve a couple of queries.	Esther Harvey
10/01/19	• Formal change request updated with Fujitsu, detailing Post Office's requirements post clarification workshop.	Esther Harvey

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	• Further change requests raised with ATOS and Computacenter to support the Fujitsu release. • EUM Balancing Enhancements Customer Solution Proposal received from Fujitsu for Post Office review.	
16/01/19	Further instance identified with FAD: 453340.	Esther Harvey
17/01/19	Post Office formally respond to Fujitsu's EUM Balancing Enhancements Customer Solution Proposal, as part of their impact assessment.	Esther Harvey
22/01/19	Post Office provide uplifted business requirements to Fujitsu, based on review of the EUM Balancing Enhancements Customer Solution Proposal.	Esther Harvey

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Appendix A – branches impacted

No#	Fads	Dates	Branch name	Branch type	Notes
1	**152542**	22/08/2018, 29/08/2018	Alderholt	LM	2 counters 22/08/2018, 29/08/2018 78 321 13 BP roll
2	**236855**	14/11/2018.	Kirkintilloch	MAIN	PC0275532, original call. BP roll
3	**168005**	22/08/2018.	Wormley	LM	130 transactions 334 net cash 48 Fad Hash BP roll
4	**422205**	13/11/2018.	Coventry	MAIN	7 transactions 0 net cash 67 Fad Hash BP roll
5	**189349**	31/10/2018.	Thirsk	MAIN	21 transactions 8 net cash 77 Fad Hash BP roll
6	**204647**	21/11/2018.	Ludlow	MAIN	4 transactions 0 net cash 91 Fad Hash PM reversed txns. BP roll
7	**424801**	19/09/2018.	Macduff	LM	40 transactions 166 net cash 97 Fad Hash BP roll
8	435555	31/10/2018.	Penzance	MAIN	424 transactions 34 net cash 99 Fad Hash BP roll
9	311130	10/10/2018	Debenham	LPM	11 transactions 273 net cash 90 Fad Hash TP Roll
10	410226	12/09/2018	Corby	MAIN	2 transactions 0 net cash 114 Fad Hash. Just AntiBribery Corrup2018 training. TP roll
11	178113	05/12/2018	Sutton	LM	
12	374306	27/12/2018	Queensbury	LM	Node 2 10 transactions
13	002113	11/12/2018	Haverhill	Crown	Node 8, user 6VDW01, Stock Unit DD
14	473458	12/12/2018	Icknield Way	LM	Branch left 3 transactions on stack, temp lock, timed out just after BP was rolled on another counter.

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					Office has already logged out / in again, so "capped". 3 transactions, zero net value.
15	391230	18/12/2018	Huntingdon	MAIN	Node 2 12 transactions EUM LOCK at Branch 391230 SU:FF TP:9 BP:3 User:RNSP01 Node:2 has 3 transactions after rollover 18-DEC-18 08.23.37.5701
16	371432	09/01/2019	Macclesfield	MAIN	Node:4 currently has 9 transactions after rollover 09-JAN-19 09.52 09 Jan 2019
17	190406	09/01/2019	Great Lever	MAIN	Node:2 currently has 3 transactions after rollover 09-JAN-19 15.27
18	133006	10/01/2019	Kensington Church Street	IFPO	Node:2 has 6 transactions after rollover 10-JAN-19 09.33.54.2294
19	453340	16/01/2019	Hasland	Main	Node 2 user KJRN stock unit SP1