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FUJITSU

shaping tomorrow with you

NFSP Briefing

4th July 2012

F/955/1

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Agenda

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Introductions and Scene Setting	10:00 – 10:10	Mark Gordon
Horizon Overview	10:10 – 11:00	Alex Kemp
Horizon Resilience Model	11:00 – 11:30	Alex Kemp
Capacity Management Transaction Monitoring Event Management	11:30 – 12:30	Steve Parker Steve Bansal
Lunch	12:30 – 13:00	
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Tactical/Strategic Plan Update	14:00 – 15:00	Graham Welsh
AOB	15:00 – 16:00	
Close	16:00	

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History & Overview

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- 1996 – 1998 ICL Pathway Contract
- 1999 – 2007 Horizon
- 2008 – 2015 Horizon on-Line
- Horizon On-line (Active/Passive Datacentres)
  - 11,500 Locations
  - 30,000 Counters / 68,000 users/logons
  - 42,000,000 Transactions/week
  - Largest ADSL network in Europe
  - Transaction processing time typically circa 0.5 second
  - 11,000 Helpdesk incidents/month
  - >900 servers in 2 Datacentres and Bracknell test location
- One of Fujitsu's largest UK private sector customers

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Horizon On Line – Key Deliverables

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- Data Centre Operations
- Central Network Service
- Engineering Service
- Systems Management Service
- Horizon Service Desk
- Branch Network Service
- Service Management Service
- Application Development
- Application Support

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Horizon Online System Overview

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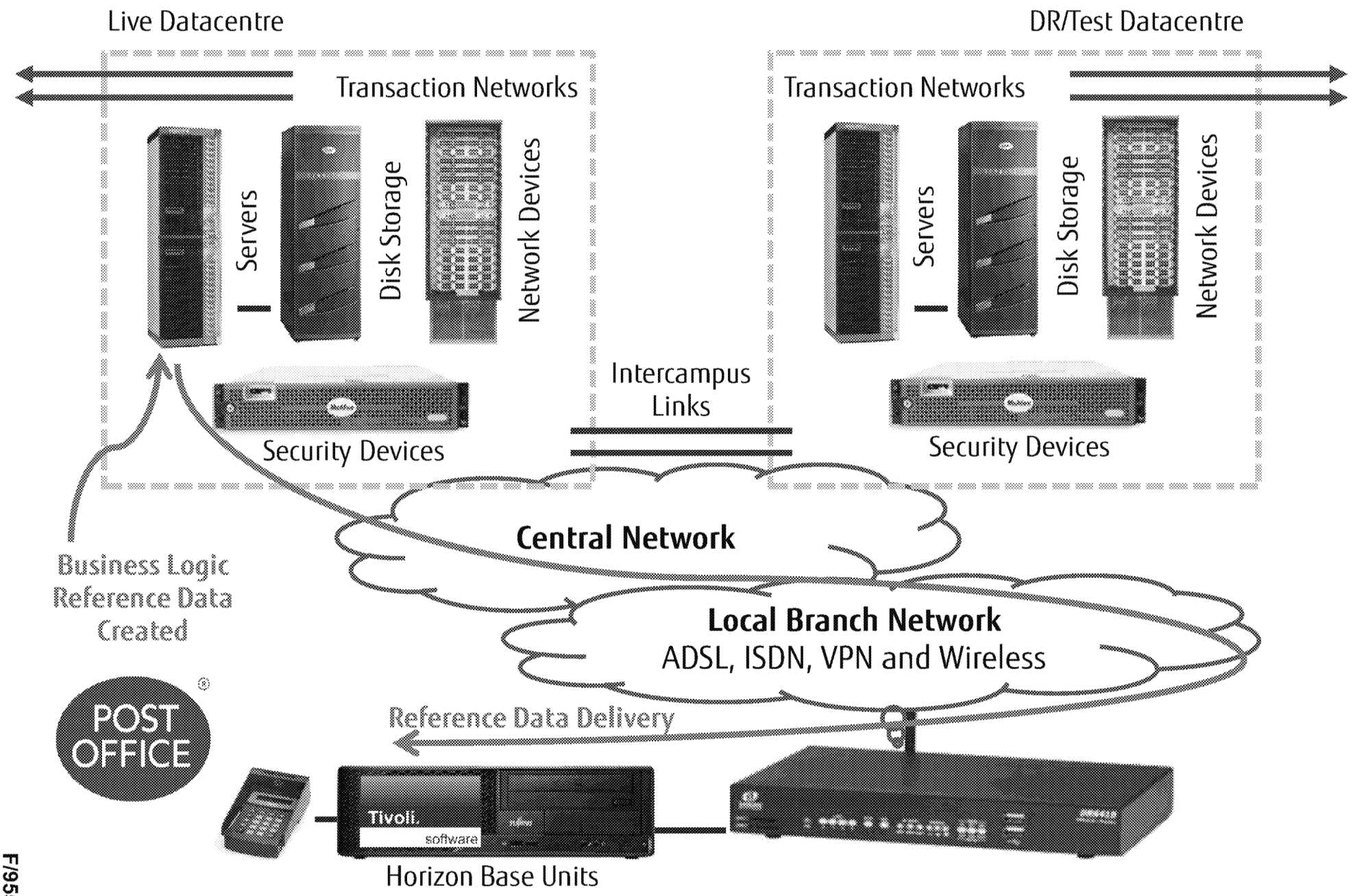

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Branch Base Units

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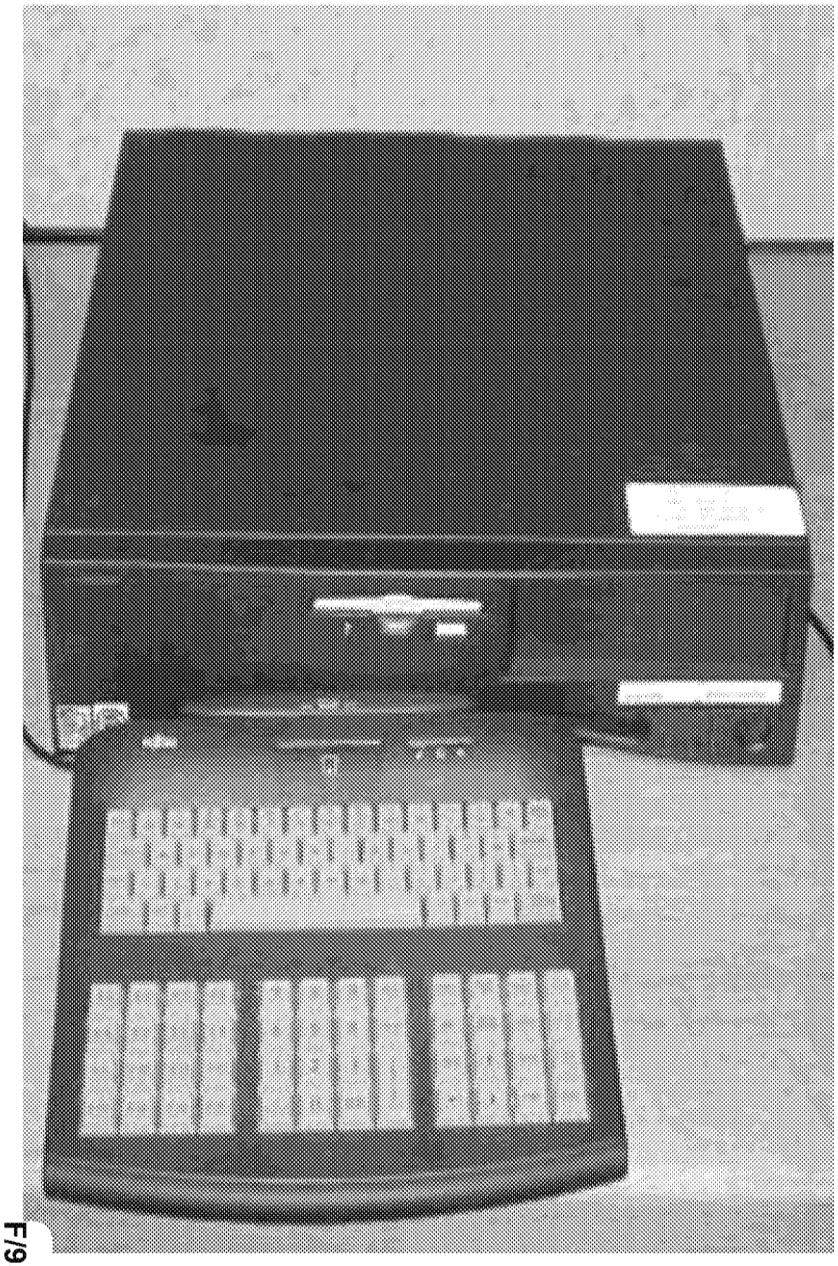

- High quality Fujitsu PCs with 300 (1%) base unit breaks per month.
- Advanced point of sale functions
- Reference Data can dynamically change prices and products.
- Encrypted internal hard drive(s)
- Encrypted individual transactions.
- Virtual Private Network (VPN)
  - ...to data centres
  - ...between branch counters

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Branch Router and Local Branch Networks

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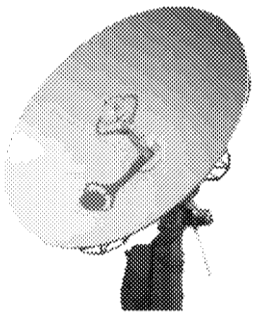
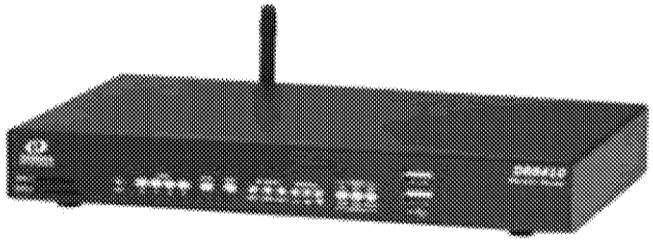
- 4 main network technologies:
  - ADSL – broadband
  - ISDN – digital dialup network
  - VSAT – satellite dishes
  - Wireless 2G / 3G – on Vodafone and EE (Orange/T-Mobile) SIM cards.





orange

T··Mobile·

everything everywhere

vodafone

BT

- Special locations:
  - Mobile Vans
  - Kingston Telecoms in Hull
  - Rural Serve Locations (e.g. Pubs)
  - Overseas British Forces (BFPO)
  - Events (e.g. Party Conferences)

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Branch & Central Network

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- Brings together BT, TalkTalk, C&W, Internet, EE and Vodafone traffic.
- Diverse cable paths where available.
- Enterprise quality Cisco and Juniper devices with complex configuration supporting multiple environments.
- 94 routers, 105 switches, 68 firewalls in Post Office data centre racks.
  - Application Control Engines (ACE) for load balancing individual traffic paths.
- Horizon has one of the world's largest network management systems.

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Horizon is a highly secure system

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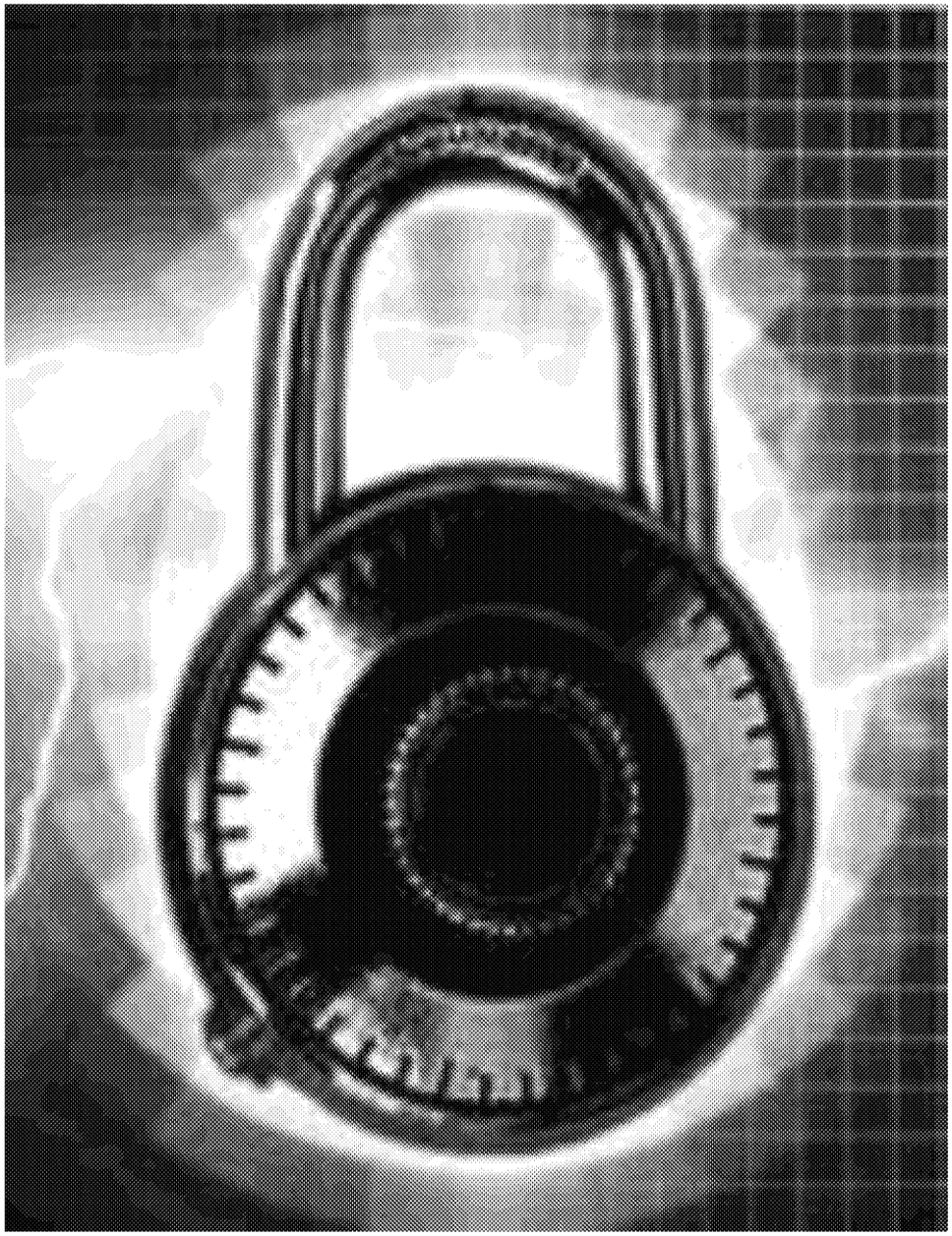
- Intruder detection on inbound network packets
- File integrity monitoring
- Anti virus updates
- Operating system patching
- Regular key material refresh
- Regular security audits
- Support users:
  - Limited vetted UK staff have access to transaction data
  - All system commands are controlled and logged
  - Ikey logon protection



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Horizon Data Centre Servers

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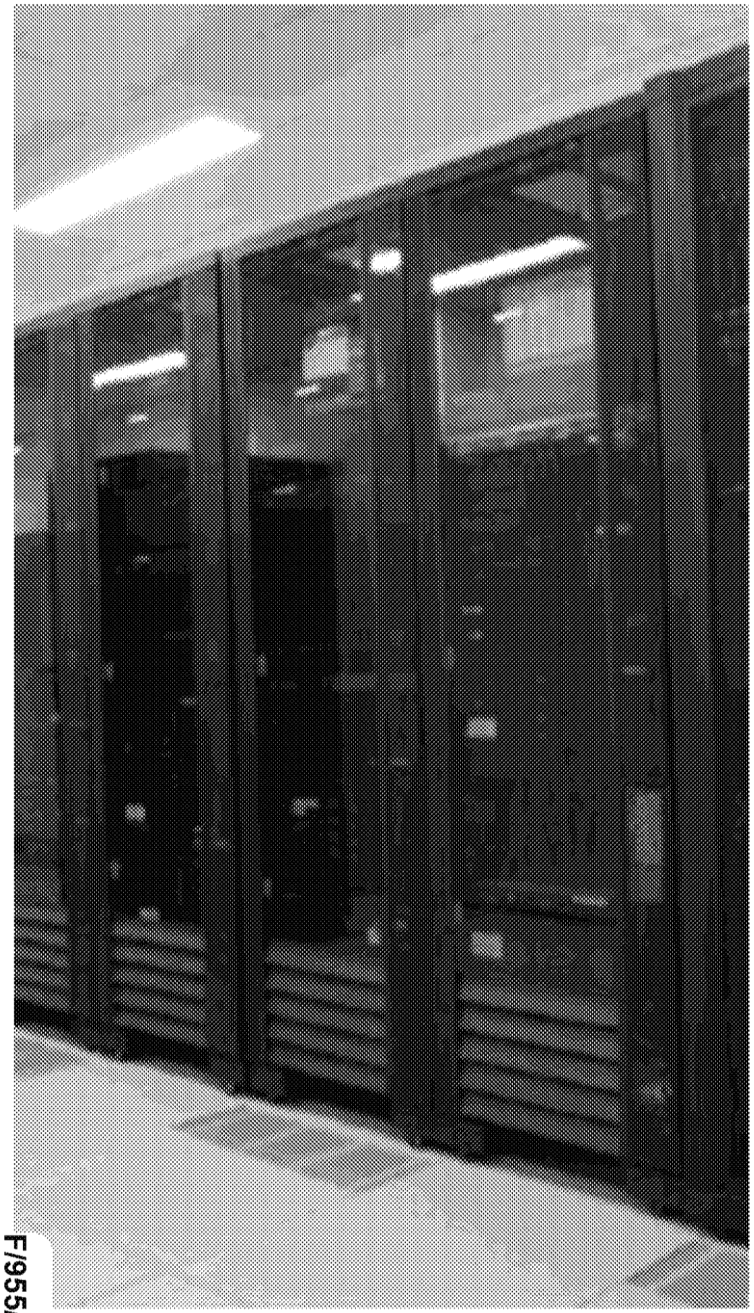

- >900 servers of which 40% are live and 60% are for test and software development.
- >120 different "types" of PO servers running Linux, Windows and Solaris.
- Mostly virtualised on "Bladeframes"
- High volume of change per annum:
  - 1,800 operational changes.
  - 1,500 software release notes (each usually updating multiple servers).
- >2 million overnight batch jobs per annum (backup, file transfers, etc).

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Horizon Data Centre Storage

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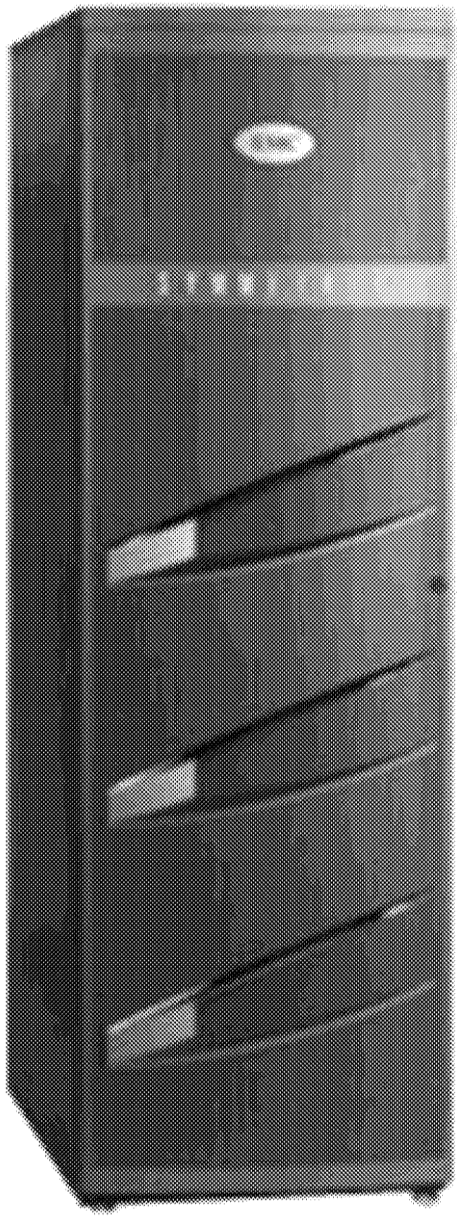
- Online storage is critical for the operation of Horizon Online servers
- Data is automatically copied between the data centres over 20Gbps intercampus links ir milliseconds.
- 5 different storage technologies:
  - DMX – super fast online storage
  - Clariion & Celerra – online storage
  - Centera – write once audit arrays
  - Virtual Tape Libraries – for backups
- Post Office data centres have over 2,500 concurrently spinning hard drive spindles!



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Transaction Networks

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- Post Office data centres are connected to lots of different transaction providers around the world.
- Fujitsu monitor the transactions and network connections (where allowed) to identify failure events.
- Failures with external providers can cause particular transaction types to become unavailable on Horizon.
- Transactions are reconciled overnight.
- Post Office employees can access reports to analyse transactions.

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Resilience Introduction

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- "the ability to provide and maintain an agreed level of service in the face of faults and challenges."
- Given the volume of equipment used to support the Horizon service resilience incidents happen at predictable frequency (e.g. hard fault on a network circuit every 6 years).
- Resilience loss resolved by Incident Management Process.

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Horizon Resilience Levels

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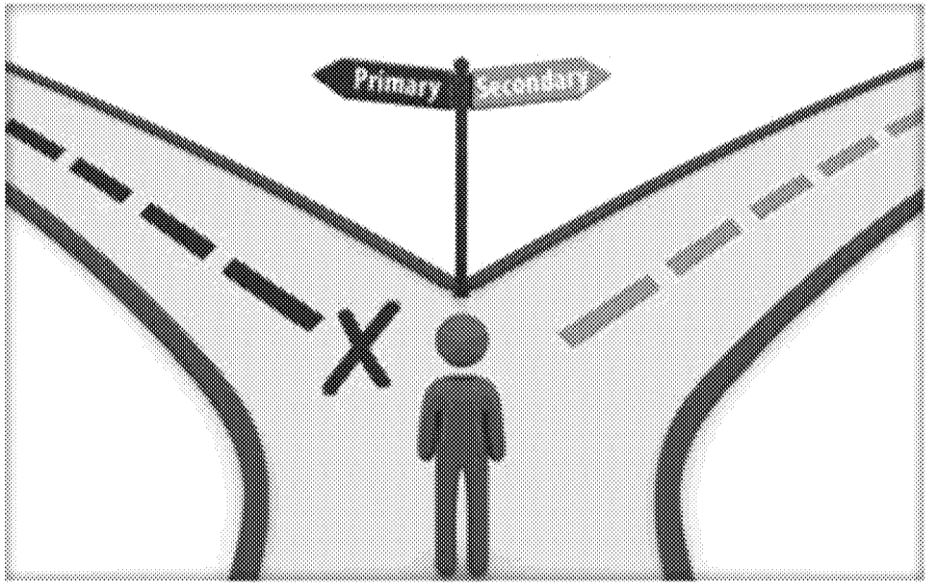

- **Immediate/Automatic** – for components necessary for PO branch trading. Horizon design target is that any required automatic failovers complete within 2 minutes.

- **Intermediate** – for components which are not used in PO branch trading, but are still essential for daily operations. (typical recovery time within 2 hours).

- **Longer Term** – for components with negligible impact to live service. This might include test rigs, provisioning servers, or cryptographic key generation workstations.

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3 types of Immediate/Automatic failover

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- **N+1.** N servers are capable of handling the full workload, with N+1 deployed; an intelligent switch (e.g. Cisco ACE) probes each server to confirm if service is available – then distributes requests across all active instances.

- **Active/Standby pairs**. Active and warm standby servers are each capable of handling the full workload. They exchange heartbeat messages and the standby will only take over if it decides that the active server has failed.

- **Clustering**. A cluster is configured using a chosen technology (e.g. Oracle Database); such that should a cluster member fail, remaining servers will automatically take over the workload.

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Important Service Resilience Models

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Branch Access Layer	N+1 Load Balanced Server Array
Branch Database	Primary – 4 Node Oracle Database Cluster Secondary – Oracle DataGuard (manual failover)
Network Banking & APOP Postal Order Database	Oracle Database Cluster
Main Host Database	Active/Standby Clustered Configuration
Debit Card and EtopUp Agents	Active/Standby Clustered Configuration
Network Banking Agents	Active/Standby Clustered Configuration
DVLA, PAF, APOP & Moneygram Agents	N+1 Load Balanced Server Pair

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Central Network Resilience

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- Design has no single points of failure.
- Cisco components - excellent reputation and the Horizon hardware reliability exceeds vendor targets.
- Intercampus links ordered with full seperacy/diversity.
- WAN services ordered with full seperacy/diversity.
- Triangulation of some WAN external services.
- Firewall clustering with configuration replication.
- ACE (Load Balancing & Transaction Encryption Terminating) active/standby Cisco switches including the ACE Modules with configuration replication.
- Ongoing failover testing as part of agreed annual test plan.

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Data Centre Site Resilience

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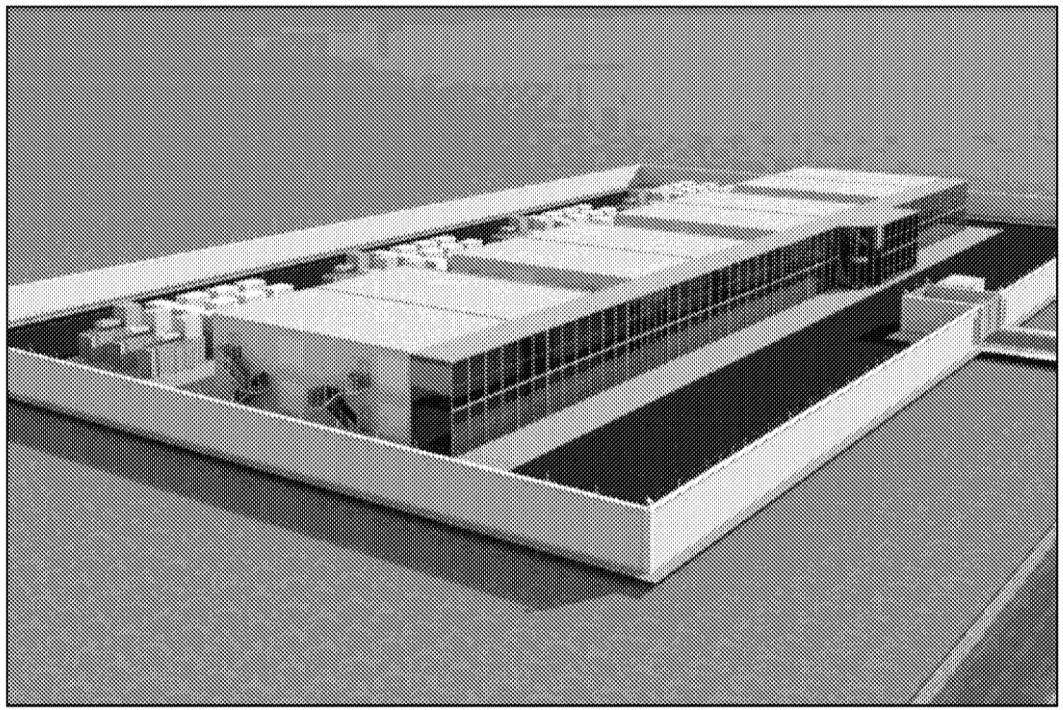
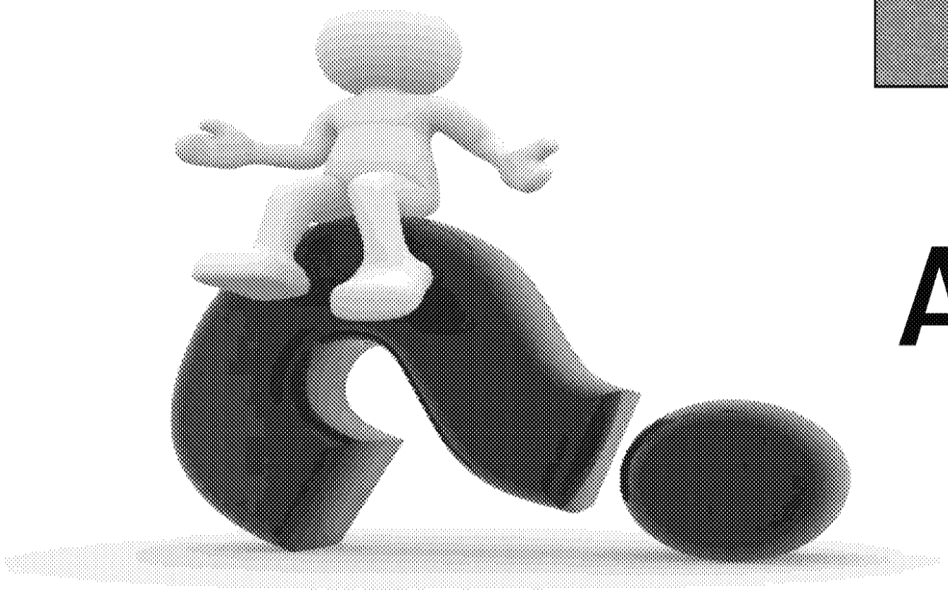
Data Centre environment provides facilities resilience:

- Air Conditioning
- Multiple Mains Feeds
- UPS Batteries
- Fuel Generator





Any Questions?

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Capacity Management & Limits

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- Capacity Management:
  - Post Office estimates the business volumes
  - Fujitsu implement the infrastructure to support those volumes.
- Limits:
  - Contractual Limit
    - The maximum volumes that Fujitsu contract to support.
  - Design Limit
    - The volumes that the system can support without significant failures.

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EPOSS and Settlement Transactions – May 2012

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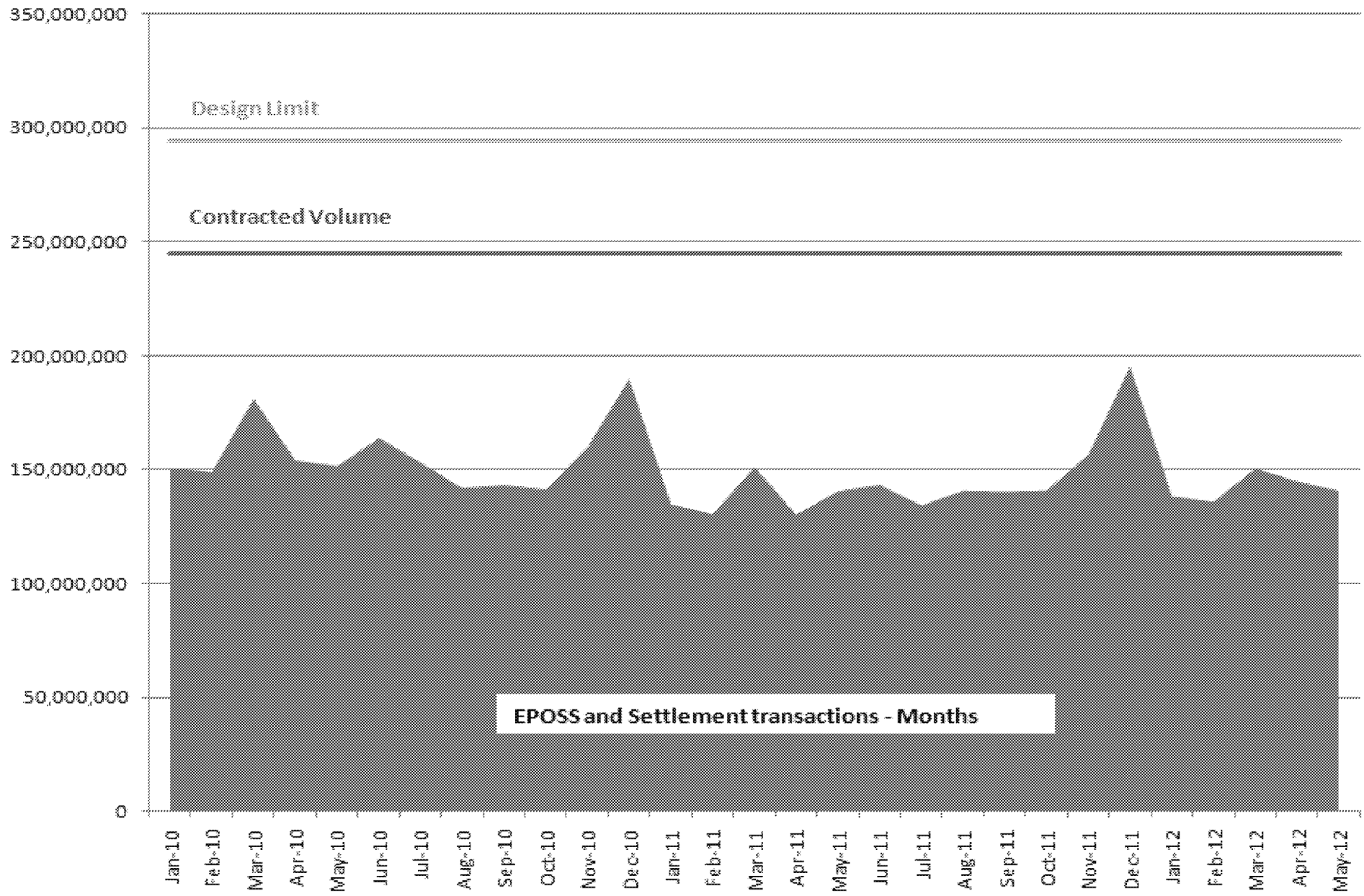
EPOSS and Settlement - Monthly



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Post Office Card Account transactions – May 2012

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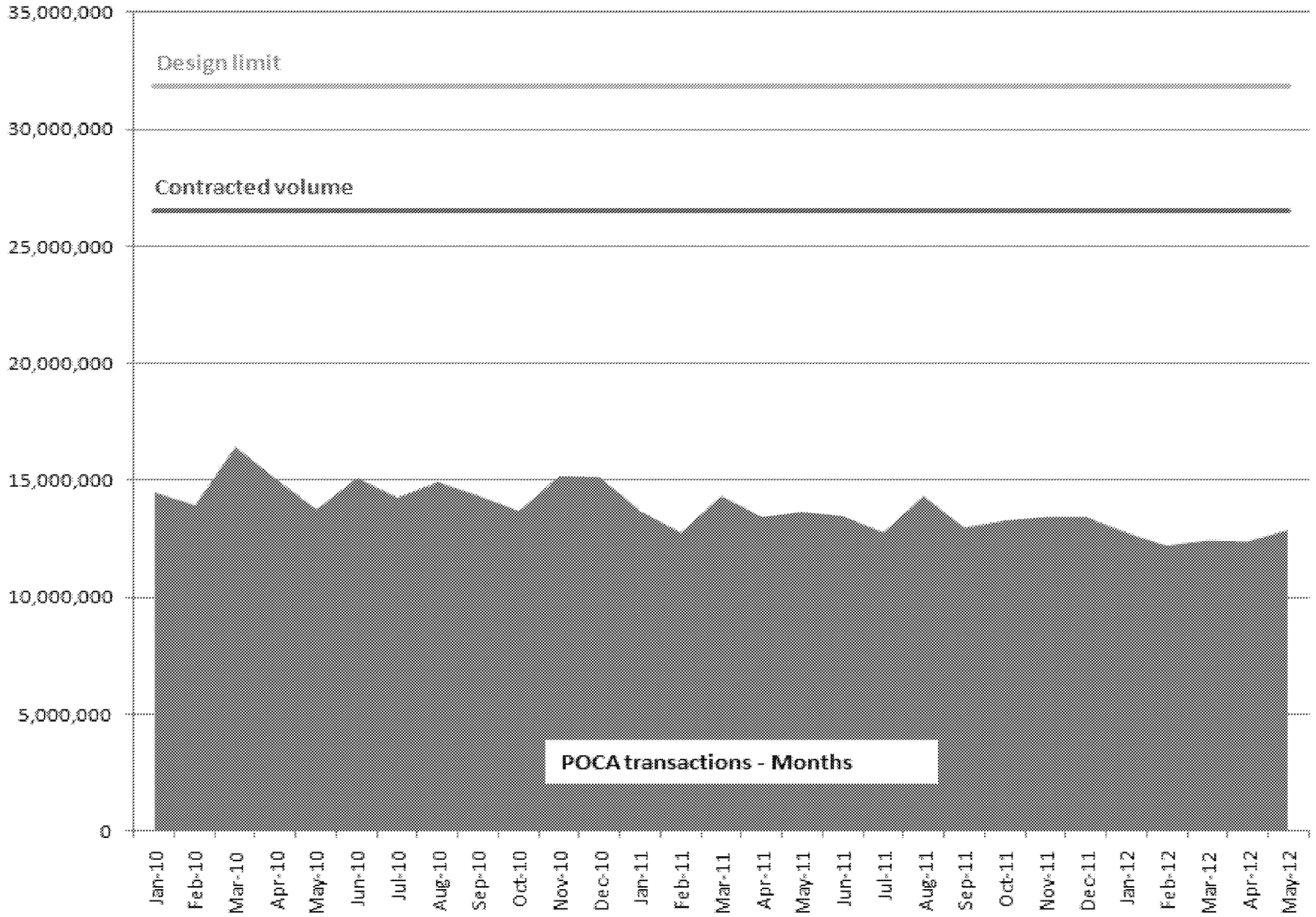
Post Office Card Account - monthly



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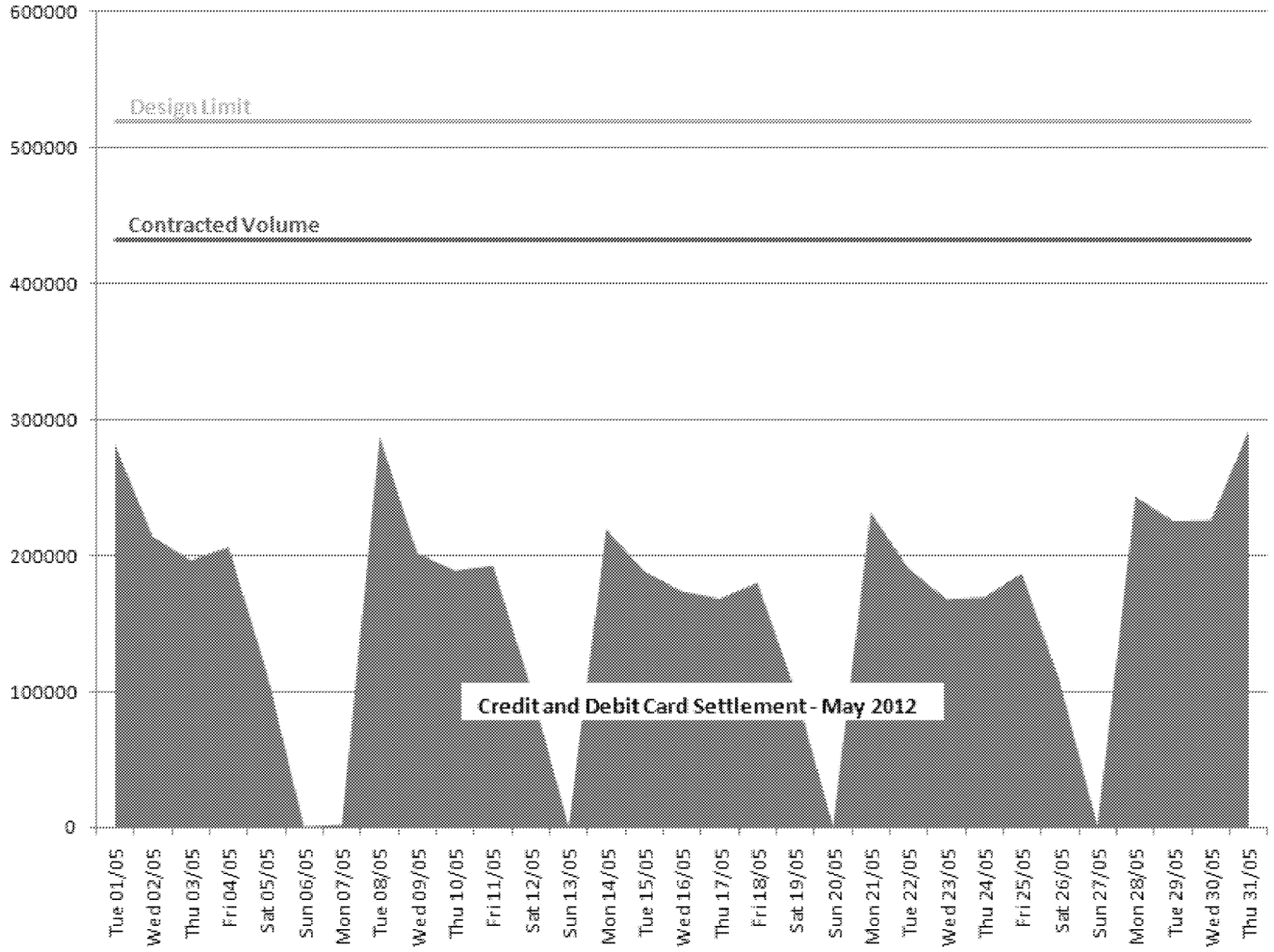
Credit and Debit Card Settlements – May 2012



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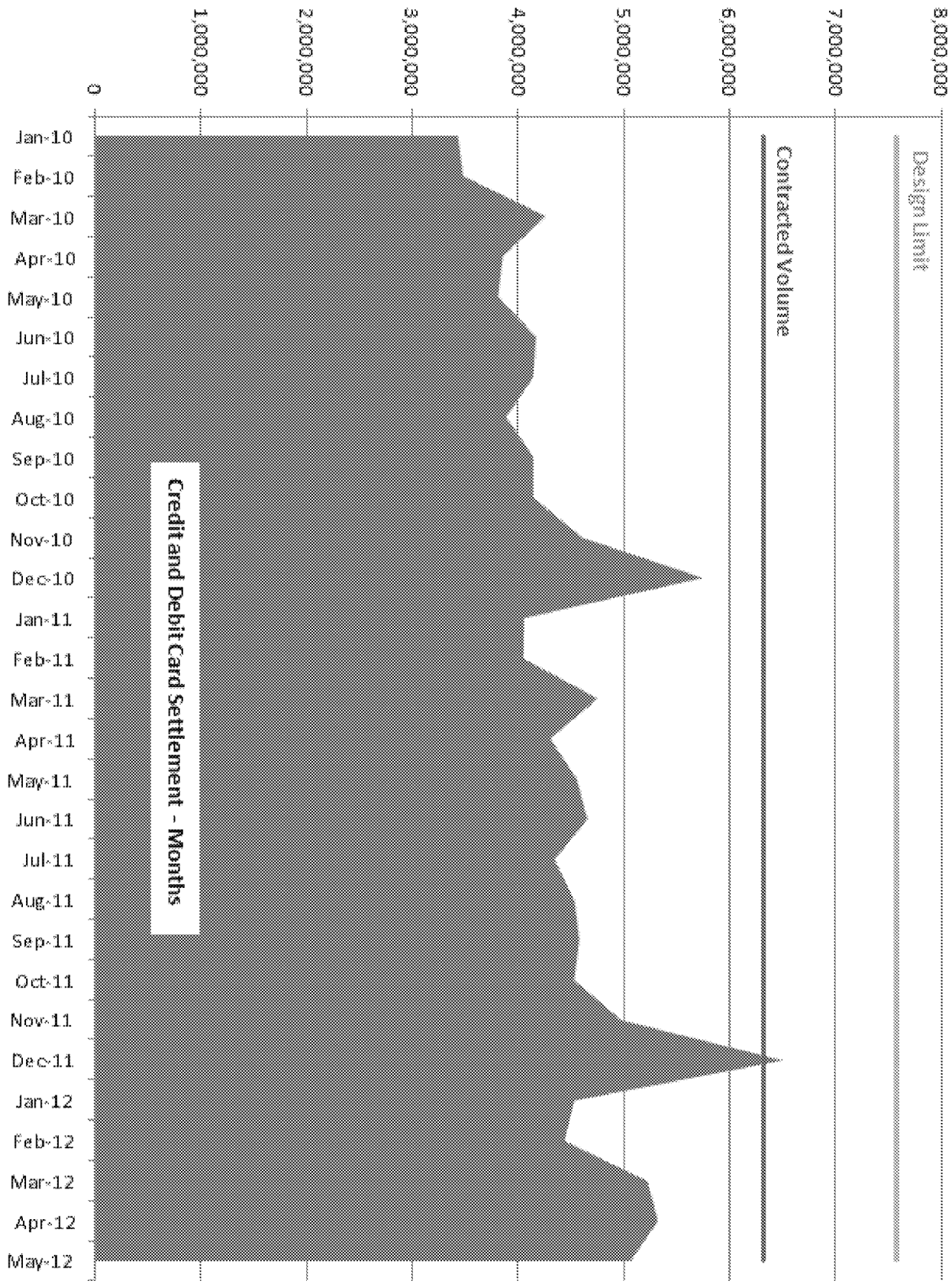
Credit and Debit Card – monthly



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Governance

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- Weekly reporting
- Conference call every two weeks
- Monthly review meetings
- Escalation to Service and Commercial review

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Monthly review - summary

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Service		Transact Peak / Day	Transact Ave / Day	Total Transactions	Average Transaction % Daily Last	Daily YTD	Monthly YTD	Succes	Comments
NBS	Network Banking	1,293,506	631,138	19,565,288	6.2	1.6	3.6	99.99%	
CAPO	Card Account Transx	998,579	415,755	12,888,401	3.9	0.7	2.7		Vocalink continuing to increase, monthly total at 92% of contracted volume. At least two proposals under discussion which may increase Vocalink transactions.
Santander	Personal & Business B	87,229	47,091	1,459,812	8.0	0.8	2.8		
Vocalink	Banking Services	264,484	168,293	5,217,075	11.6	3.9	5.9		
DCS	Debit/Credit Card Settlement	292,055	163,440	5,066,645	-4.8	1.0	3.0	99.98%	Steady increase year on year, may need review before peak business towards year end
ETU	Electronic Mobile Top up	48,905	27,377	848,695	8.1	1.0	3.0	99.77%	
Web Services									
DVLA	DVLA Tax Disc	276,132	58,434	1,811,467	3.7	-2.8	-0.8	100.00%	
Kahala	Parcelforce	541	298	9,246	18.2	8.5	10.7	99.92%	
Telecoms BACS	Bank Account Checker	18,819	10,222	316,885	8.1	-0.2	1.8	99.87%	
Telecoms AD	Broadband Checker	463	236	7,315	51.9	-45.0	-43.9	96.98%	
APOP	Automated Postal Orders & Payout	159,608	95,806	2,969,986	3.1	-3.0	-1.1	100.00%	
MoneyGram	Money Gram cash	60,133	32,363	1,003,243	12.6	7.3	9.4	99.94%	
PAF	Postal Address Finder	54,207	32,183	997,661	21.9	8.7	10.9	100.00%	
Transaction Volumes									
APS	Automated Payment Bill Payment Service	1,057,578	555,565	17,222,509	7.1	4.5	6.6		
BDC	Bureau De Change	100,362	41,686	1,292,255	30.5	31.0	33.6		seasonal increase
EPOSS	Electronic point of Sales & Service	9,514,299	4,549,354	141,029,962	-2.9	-2.9	-1.0		
New Services									
AEI	App Enrolment Identification	4,408	2,781	86,221	11.2	6.2	8.3	99.96%	
PCAI (PoCa)	Post Office Card Account Issue	5,152	3,002	93,063	10.2	3.4	5.5	99.99%	

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Web Transaction Monitor

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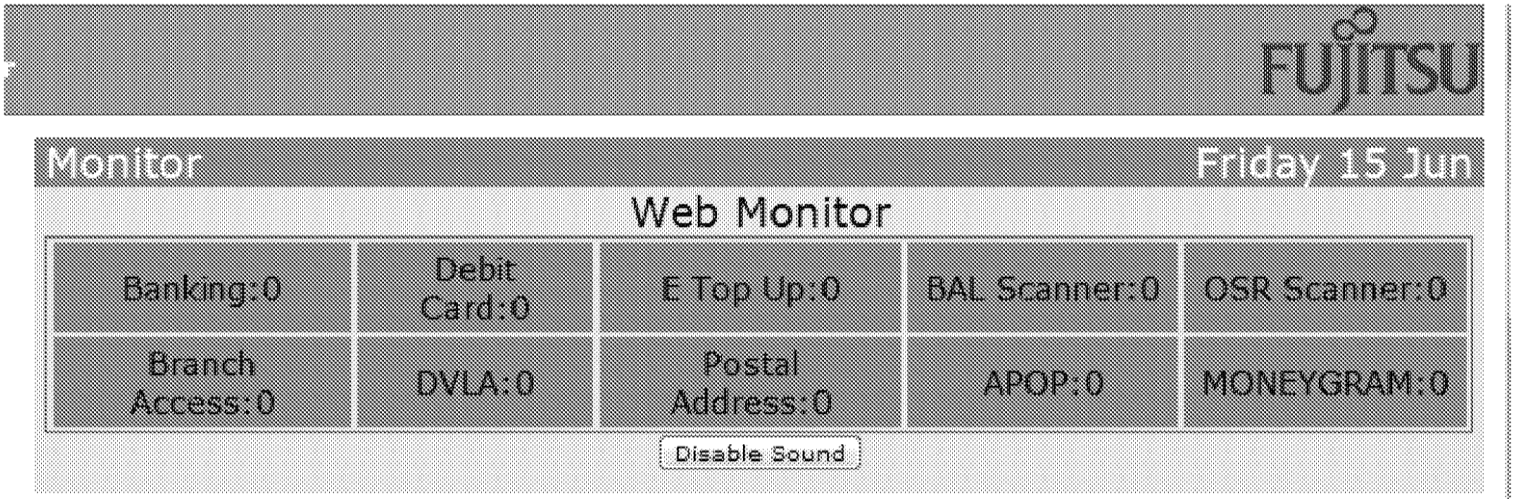

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Details of transactions

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S S C Web Monitor

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Banking ?

Friday 15 Jun

Monitor:HNGX_NWB_SCANNER Start Time: 2012-06-15 11:24:34 End Time: 2012-06-15 11:34:34

Response Code:	Description:	Count:	%
1	Authorised OK (Bank)	7690	95
2	Declined by Bank - Impound Card	1	0
3	Declined by Bank - Invalid PIN	139	2
4	Declined by Bank - Insufficient Funds	114	1
6	Declined by Bank - Usage Violation(amount)	13	0
7	Declined by Bank - Transaction not supported	1	0
8	Declined by Bank - Other	16	0
9	Declined By Bank - Maximum PIN tries exceeeded	1	0
23	Failed by FI - Retry Transaction	2	0
26	Failed by FI - Try later, FI unavailable - Return card	1	0
43	Failed by Counter:Counter Timeout	2	0
51	Failed at Counter: Card check failure (by PO clerk) before Ack Received	1	0
55	Cancelled during pin entry	138	2
56	Transaction declined by PinPad before R1	1	0
82	Cardholder Verification Error	4	0

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Drill down

S S C Web Monitor

Monitor ?

Friday 15 Jun

Response Code:3 Start Time: 2012-06-15 11:34:34 End Time: 2012-06-15 11:44:34

Bank:	Count	%
A&L	4	3
Santander	2	1
Barclays Bank Plc	3	2
LLoyds TSB	18	12
Nationwide Building Society	2	1
The Co-operative Bank	8	5
CAPO	97	66
HBoS	5	3
Northern Bank Ltd	1	1
RBS	4	3
Yorkshire Bank Plc	1	1
NS&I	2	1
Post Office Financial Services	1	1

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Usage

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- Monitored by Systems Management Center
- Alerting notified to Fujitsu and Post Office duty mangers

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Managed Environment

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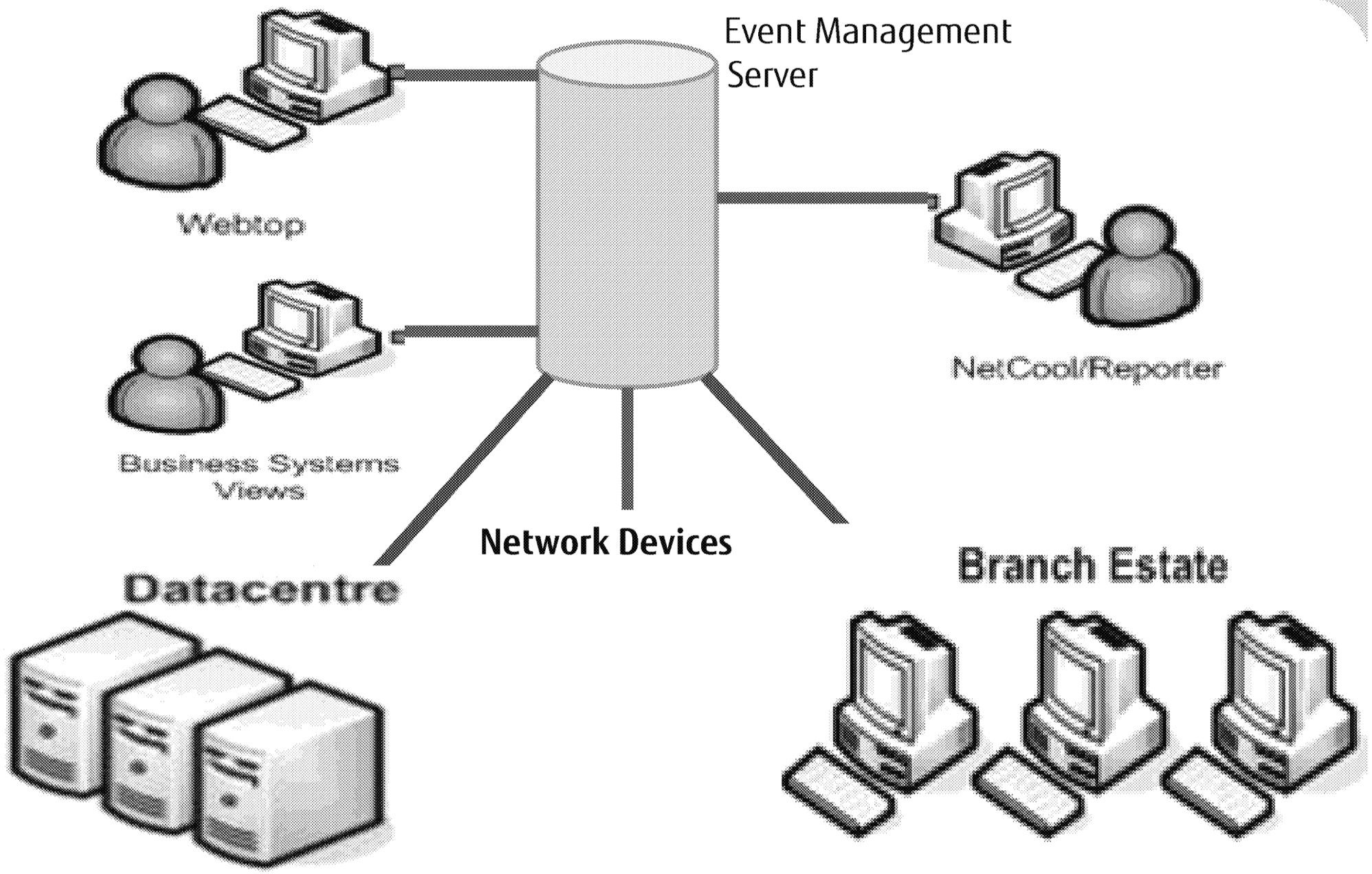

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Central Views

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- Tivoli Business Service Views (TBSM) view alerts in a business' context, correlated to the application or system that is impacted
- WebTop provides a filtered view of all events not consumed within TBSM including counter and Security Alerts
- Reporter holds Event Data consumed by TBSM and WebTop for 1 month to allow historical reporting.
- All events that reach SYSMAN are audited

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Tivoli Business Service Views

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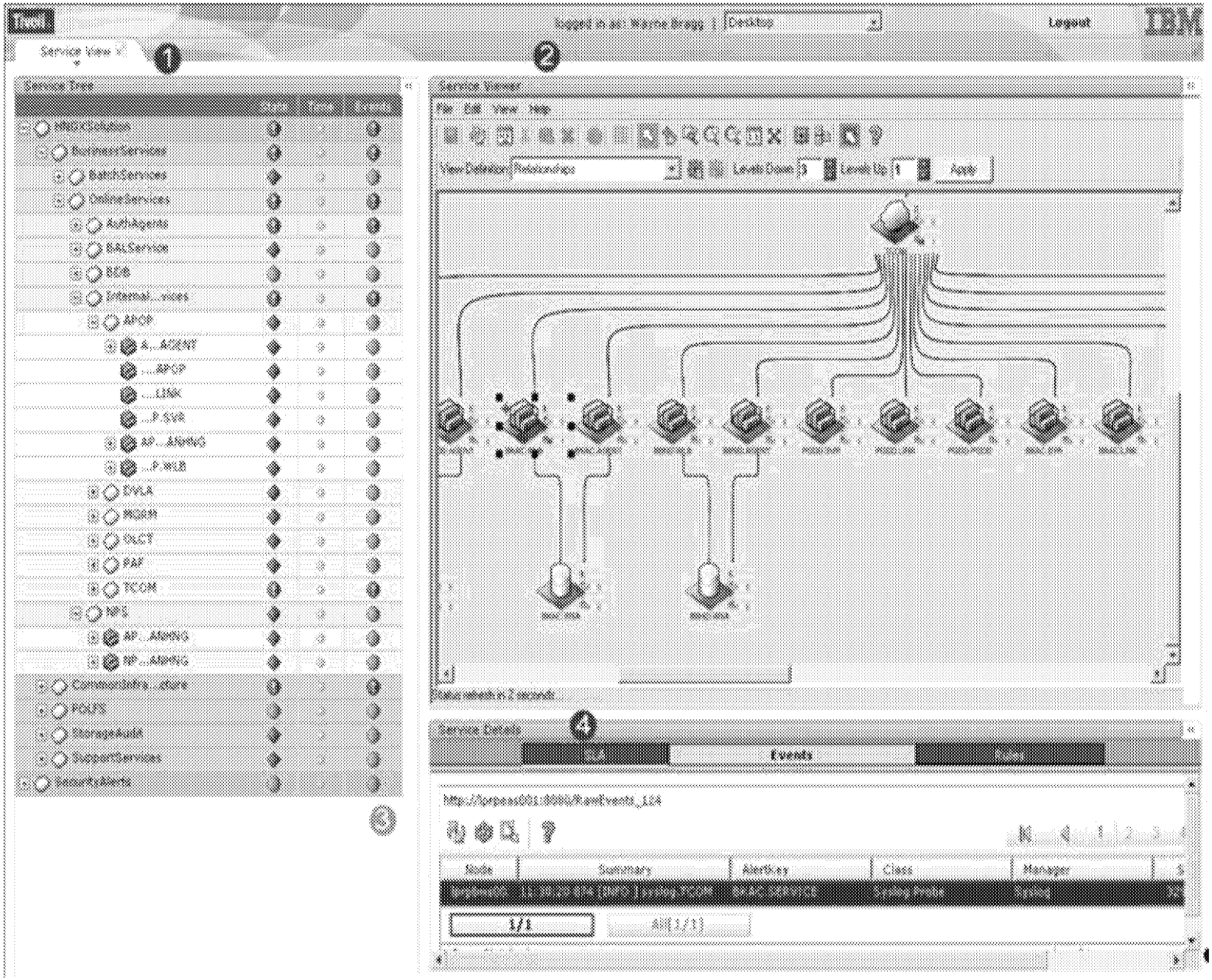

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WebTop

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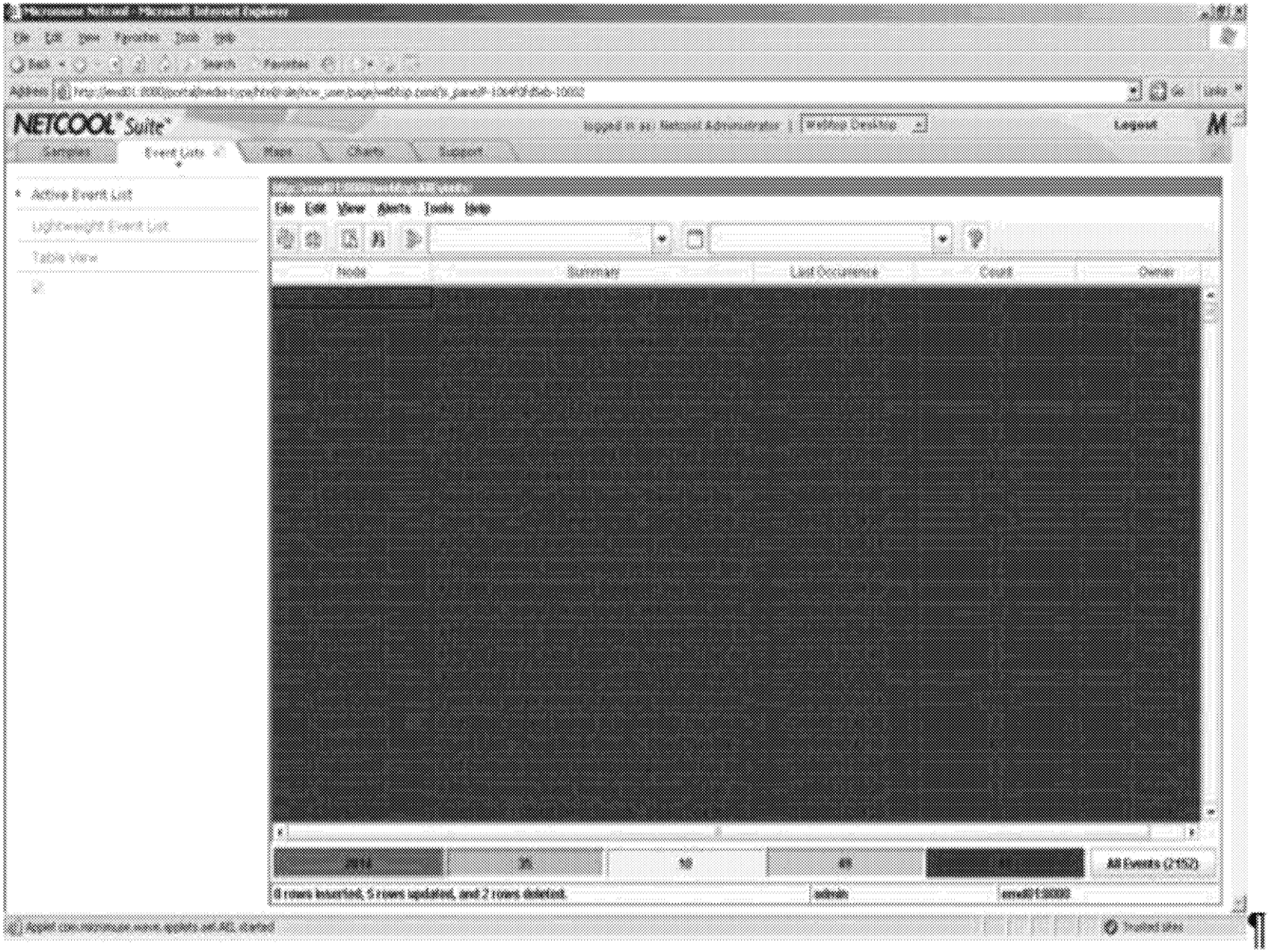

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Event Data

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- Collection of 1.6 million plus events per day
- Security Events
- Application events
- Simple Network Management Protocol Events
- External Application Health Checks
- Business Application Data

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Major Incident Summary

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- 12 December 2011 Server/Storage Disk Locking
- 1 February 2012 Ref Data Token Error
- 1 March 2012 Suspected Cisco ACE Blade
- 2 April 2012 Security Patching
- 25 April 2012 Debit Card (Streamline/TNS)

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Major Incident Detail

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- **12 December 2011 – Server/Storage Disk Locking**
  - 12:54 - 14:30 degradation to on line transaction service
  - Database locks caused by Bladeframe firmware issue
  - 11 actions identified (all complete)
  - No reoccurrence

- **1 February 2012 – Ref Data Token Error**
  - 08:00 - 11:15 loss of POCA and 1% of AP transactions
  - Caused by code logic weakness
  - 23 actions identified (all complete)
  - No reoccurrence

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Major Incident Detail

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- **1 March 2012 – Suspected Cisco ACE Blade**
  - 11:07 - 14:25 degraded transaction processing
  - Caused by suspected software bug on ACE Blade
  - 6 actions identified (all complete)
  - No reoccurrence

- **2 April 2012 – Security Patching**
  - 08:00 – with reducing impact until 11:27 causing performance issues at 4% of the estate
  - Caused by security patch issue that did not occur during testing
  - 13 actions identified (12 complete)
    - 1 open action to recreate fault in test environment
  - No reoccurrence

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Major Incident Detail

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- **25 April 2012 – Debit Card (Streamline/TNS)**
  - 11:18 – 12:19 Debit and Credit card transactions
  - Caused by suspected fault in transaction provider domain
  - 9 actions identified (all complete)
  - No reoccurrence

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Problem Management

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- Counter Transaction Processing

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Problem Report

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Affected End User	Branch Estate
Reported by	Alex Kemp
Problem Manager	Andrew Hemingway
Classification	O Operational S Software
Number of Users affected	40-70% of user base
Urgency	2
Priority	2
Problem Summary	Counter Transaction Performance Last week we analysed the milliseconds each transaction takes and found an issue in the recent version of the IBM Tivoli software that has affected counter transaction performance
Problem Description	. Most of the counters now have this version of the software. We are still well inside SLA but it is not as optimum as we would usually prefer. The issue was not happening all the time so PMs would perceive periods where their counter would appear to go slowly and then speed up again. Impact When a counter (with the new version) would experience over doubling of transaction times. The transactions were still completing and not timing out.
Assignee/Group	Steve Bansal
Linked Incidents	(list the incidents which are linked to the problem)

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Problem Management

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Counter Transaction Processing

Bansal, Steve 27/06/2012 12:32 00:01:04 Log Comment POA-Horizon Meeting has been scheduled for 29/06/12 with SDU's to agree impacts and limitations of software actions Bansal, Steve 27/06/2012 09:17 00:10:02 Log Comment POA-Horizon A workshop has been held on this issue and a resolver group have reviewed the issue.
MSS (JA, SBM,AC), SMG (MC), SMC, RM (JB), Test (BS, MW) and Integration (MS)
The current work around will remain in place with a clear set of working instructions.
Actions
1) MSS - To produce a work instruction for support teams to toggle notifications on and off. This will take into account MSS work shift patterns.

2) RM - To provide MSS with Release Note instructions for all composite products, to pre cache products that need to be. This will go through LST testing.
Bansal, Steve 27/06/2012 08:55 00:00:35 Log Comment POA-Horizon Fujitsu response back 25/06/12
The newer Tivoli version has been in distribution for the past few months and is nearly complete.
Our workaround is that we have changed the scheduling for how jobs are loaded for the overnight software distribution. Collecting the notification of new scheduled jobs causes an unexpected performance issue in the newer version. The scheduling of work is a human function and the counter impact happens a bit later. There are some days where no jobs are scheduled so there is no impact. The actual jobs are running out of hours as per the older version.

Bansal, Steve 27/06/2012 08:51 00:01:32 Log Comment POA-Horizon Fujitsu response 25/06/12
Last week we analysed the milliseconds each transaction takes and found an issue (that Mark Gordon has briefed Dave Hulbert about) in the recent version of the IBM Tivoli software that has affected counter transaction performance. Most of the counters now have this version of the software. We are still well inside SLA but it is not as optimum as we would usually prefer.

Bansal, Steve 27/06/2012 08:50 00:00:41 Log Comment POA-Horizon POL (Alex Todd) contacted Fujitsu on 25/06/12
We are getting feedback regarding transaction speeds.

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Agenda

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Introductions and Scene Setting	10:00- 10:10	Mark Gordon
Horizon Overview	10:10 – 11:00	Alex Kemp
Horizon Resilience Model	11:00 – 11:30	Alex Kemp
Capacity Management Transaction Monitoring Event Management	11:30 – 12:30	Steve Parker Steve Bansal
Lunch	12:30 – 13:00	
Major Incident History	13:00 – 14:00	Steve Bansal
Tactical/Strategic Plan Update	**14:00 – 15:00**	**Graham Welsh**
AOB	15:00 – 16:00	
Close	16:00	

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Four Step Plan - Objectives

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Tactical investigation and activity to ensure stability in the short term

- Independent Service Line peer review
- Employing Fujitsu and partner experts to review and make changes as needed to ensure system and monitoring in place to address similar incidents occurring (Oracle / Cisco / EMC etc)
- Detail the four incidents and why separate and not endemic

Horizon Online ™system and service review performed by Fujitsu, Post Office Limited and Independent Partners with Board Level Exec steering board

- Clearly define the role of Horizon Online and the changed business needs of Post Office moving into the future
- Review team to include Account team CTO, Chris Furmanski, Fujitsu experts outside of account team and system partners including Cisco and Oracle.

Review to cover:

- Our current plans for the current upgrades planned
- Review Design of system looking at tooling, potential points of failure, resilience, business continuity
- Compare against incidents looking for systemic problems/ design constraints
- How do we stop these points causing similar failures in the future ?
- Map service affecting and non service affecting failure rates looking at trends
- Review best practice in retail and finance markets and compare against design of the current Horizon Online™
- Output – document covering findings and recommendations

Presentation to Post Office Exec and Board

- Presenting the findings from the review.
- Covering:
  - Principles of the solution design
  - Reliability, transaction volumes and scale
  - Complexity, security standards
  - Benchmark with Gartner - findings
  - Level of change related incidents and volume of change on platforms
  - Recommendations, Future and implications for Extended hours and Channel Integration

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Post Office exec visit to Data centres and monitoring in Belfast

- Exec Visit to data centres / service desk, support teams across the enterprise

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Approach & Scope

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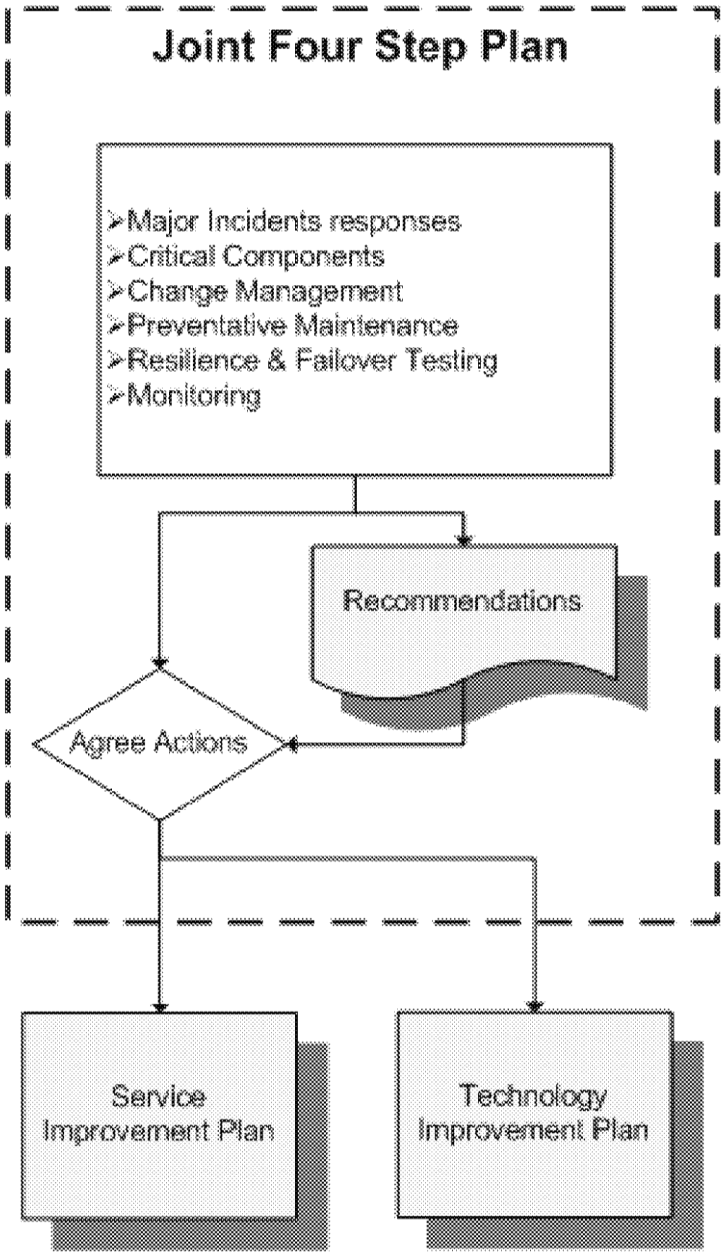
- 28 key tasks identified
  - 22 completed
  - 3 ongoing
  - 3 awaiting confirmation to Close

- Review of
  - Design
  - Infrastructure & Configuration
  - Testing & Validation
  - Process & Governance



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Specific Areas

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- Design
  - Resilience & Recovery position
    - Platforms
    - Storage
    - Networks
- Testing & Validation (Ref Data)
  - Approach
  - Relationship between Live & Test Config
- Infrastructure & Configuration
  - Independent Subject Matter Expert review & report
  - Findings Published
    - Some minor Service Improvements identified & being implemented
- Process & Governance
  - Change Processes
    - Ref Data both Post Office & Fujitsu
  - Rigs & Testing Environments
  - Communications
    - Day 2 Day
    - Forward Schedule of Change

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Agenda

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shaping tomorrow with you

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Horizon Online™ Links to Post Office Ltd. Systems

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Key Channel / Branch Focused Solutions

Paystation	Ingenico	Small footprint – competitive product to PayPoint
Post & Go	Wincor	Self Service Mail (branching into retail)
AEI	Cogent	Identify Enrolment
FS Web Portal(s)	CSC	Access to Quoting tools for FS products
POCA	HP/EDS	Benefits Card
Vocalink	Vocalink	Banking Network Connectivity
EDG	CSC	Data Gateway for Client File Delivery (Being replaced by PODG)

Key Office Solutions

POLMI (Credence)	Logica	Fujitsu (Hosting) – Management Information
POLSAP	Fujitsu	Finance
SAPHR	RMG / SAP	HR

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