FUJ00001719



**Document Title:** Horizon Capacity Management and Business Volumes

**Document Type:** Requirements

**Release:** N/A

**Abstract:** This document describes the process of managing capacity and the business workload volumes that the Horizon system will support under contract extension.

It will form part of the new contract as a CCD.

**Document Status:** APPROVED

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FUJ00001719



# 0.0 Document Control

## 0.1 Document History

| Version No. | Date | Reason for Issue | Associated CP/PinICL |
|---|---|---|---|
| 0.1 | 8/11/02 | 1st Draft - issued internally only. | |
| 0.2 | 19/11/02 | 2nd Draft following comments on 0.1 Issued internally only. | |
| 0.3 | 2/12/02 | 3rd Draft. Issued to Post Office for review | |
| 0.4 | 16/12/02 | 4th Draft following review with Post Office. | |
| 0.5 | 20/12/02 | 5th Draft following further comments by Post Office. | |
| 0.6 | 30/12/02 | 6th Draft following further discussions with Post Office | |
| 0.7 | 30/12/02 | 7th Draft following review of 0.6 with Post Office. | |
| 0.8 | 31/12/02 | 8th draft following Post Office review | |
| 0.9 | 31/12/02 | FS [final] drafting changes | |
| 1.0 | 31/12/02 | Agreed Version | |

## 0.2 Review Details

| | |
|---|---|
| Review Comments by : | 31st December 2002 |
| Review Comments to : | James Stinchcombe |

| Mandatory Review Authority | Name |
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FUJ00001719



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( * ) = Reviewers that returned comments

## 0.3 Associated Documents

| Reference | Version | Date | Title | Source |
|---|---|---|---|---|
| NewBusVols | 3.0 | | PA/PER/031 - "Horizon New Service Business Volumes" | PVCS |
| ExistBusVol | 0.1 | | PA/PER/032 - "Horizon Existing Service Business Volumes" | PVCS |
| AllocProcess | 1.0 | | TD/PRO/003 - "Process for Allocating Network Service Type to Outlets" | PVCS |
| AllocSheet | | 13/9/02 | Outlet Allocation Spreadsheet "OutletAllocation_020912.xls" | Fujitsu Services |
| | | | | |

**Unless a specific version is referred to above, reference should be made to the current approved versions of the documents.**

## 0.4 Abbreviations/Definitions

| Abbreviation | Definition |
|---|---|
| ACDB | Autoconfig Database |
| Agreement | Agreement between Post Office and Fujitsu Services dated 28 July 1999 as varied and restated by CCN 1100 |
| APS | Automated Payment Service |
| Banking Transactions | NBS and DC Transactions |
| CAPO™ | Card Account at Post Office. The official brand name of POCA (Post Office Card Account). |
| CCD | Contract Controlled Document |
| CCN | Contract Change Notice |

FUJ00001719



| | |
|---|---|
| Contracted Volumes | The volumes that Fujitsu Services contracts to support. Exceeding these volumes will cause given Service Levels to automatically not apply (see Schedule 15 for details). |
| CSR | Core Systems Release |
| CSR+ | Core Systems Release (plus) |
| DC | Debit Card. Previously known as EFTPOS. |
| Design Limits | The volumes that the system can support without significant failures. Exceeding these volumes could cause any Service Level or other obligation not to apply (see Schedule 15 for details). |
| DRS | Data Reconciliation Service |
| EFTPoS | Electronic Funds Transfer Point of Sale |
| EPOSS | Electronic Point of Sale Service |
| Historical Peak | A peak workload based on historical data from start of Horizon until 30th August 2002 |
| IIN | Issuer Identification Number |
| ISDN | Integrated Services Digital Network |
| LAN | Local Area Network |
| LFS | Logistical Feeder System |
| MIDTID | The MID/TID allocation database for Debit Card |
| MVL | Motor Vehicle Licenses |
| NB | Network Banking |
| NBE | Network Banking Engine |
| NBS | Network Banking Service |
| OCMS | Outlet Change Management System |
| OBCS | Order Book Control Service |
| Online Transactions | Transactions that require an interaction with the data centre, currently OBCS Foreigns and Banking Transactions. |
| Pathway | Fujitsu Services (Pathway) Ltd |
| POL, Post Office | Post Office Ltd |
| RDDS | Reference Data Distribution Service |
| RDMC | Reference Data Management Centre |
| Services | The services provided under the Agreement |
| SLA | Service Level Agreement |
| VPN | Virtual Private Network |
| WAN | Wide Area Network |

Terms and expressions defined in the Agreement have the same meanings where used in this document.

FUJ00001719



## 0.5 Changes in this Version

| Version | Changes |
|---|---|
| 0.1 | 1st Version |
| 0.2 | Changes following comments. Addition of section on the capacity model summary. |
| 0.3 | Changes following comments. Section 2 replaced by a formal description of the Capacity Management Service. |
| 0.4 | Changes following comments. Some parts of section 2 moved to the contract schedules. Added reference data volumes, impact of ADSL and number of Post Office branches changed. |
| 0.5 | Added wording from current responsibilities to cover Post Office providing updates to future volumes. Change to numbering in section 2 to bring in line with the rest of the document. Other changes following comments.<br>All changes are redlined except for change to numbering in section 2 (to make it more readable). |
| 0.6 | Changes to EPOSS Volumes (increased by to 5% above Historical Peak) and Online Transactions to separate core system and network. Changes to Capacity Model to reflect these. All changes are redlined. |
| 0.7 | Clarification on the source of the online transaction volumes. All charges are redlined. |
| 0.8 | Wording changes proposed by Post Office |
| 0.9 | Wording changes. |
| 1.0 | Final wording changes by Post Office and Fujitsu |

## 0.6 Changes Expected

| Changes |
|---|
| • Updates following Review<br>• Changes under CCN to the current volumes<br>• Changes under CCN to introduce new business types (e.g. E-TopUps or DVLA online). |

## 0.7 Table of Contents

FUJ00001719

FUJ00001719



# 1.0 Introduction

## 1.1 Purpose

The 'Horizon Capacity Management and Business Volumes' documents the process of managing the business workload volumes that the Horizon system will support and the capacity required to support this workload under contract extension. It will form part of the new contract as a CCD and replaces [NewBusVols] from the start date of the contract change. This document is under Hard Change Control.

The key changes from [NewBusVols] are:

- The addition of Services not previously covered by [NewBusVols] - i.e. EPOSS, APS, OBCS, LFS, Message Broadcast and Reference Data. Most of these were covered by [ExistBusVols] which was previously issued for information to Post Office.
- Addition of a formal definition of the Capacity Management Service.
- Addition of a summary of the capacity model.
- Removal of the concept of "Contracted Notice Period", "Design Limit Notice Period" and "Scalability Thresholds" - changes to capacity are now treated like any other requested change to the system rather than having specific notice periods.
- Changes to the Online Transaction Volumes required following the change in network charges from variable cost to fixed cost.

## 1.2 Scope

The intention of the document is to:

- Describe the process of managing capacity within the Horizon system, the "Capacity Management Service". This includes how the key business metrics are agreed and the impact of exceeding these (e.g. on Service Levels).
- Document the key business metrics required to determine the capacity required for the different services that Horizon provide.
- Provide a summary of the output of the current capacity model, which is used to estimate the amount of capacity required by the system.

The business metrics in this document will be used for:

- Sizing the infrastructure within the Fujitsu Services operational domain required to deliver the Services.
- Capacity Management of the infrastructure within the Fujitsu Services operational domain for those Services

FUJ00001719



- Calculating the capacity used by the workload. This allows the impact of new services or changes in volumes to be assessed.

The target audience for this document is varied and includes systems designers, capacity managers and business and financial analysts. Some parts of this document may not be appropriate for all readers.

## 1.3 Structure

Section 2 describes the Capacity Management Service and section 3 the Business metrics. Section 4 provides a summary of the capacity model.

## 1.4 Capacity Management Principles

Capacity management is a balance between risk and cost. Having significant spare headroom reduces the risk of unexpected peaks causing poor performance or service failures, but the spare capacity has to be paid for.

The agreed principles under which business volumes and capacity will be managed are:

- Post Office estimates the business volumes that the system needs to support. As part of this assessment they need to decide how much headroom or contingency for unexpected growth in volumes is required.
- Fujitsu Services will support the Contracted Volumes and implement the infrastructure needed to support that level of business volumes. This infrastructure may be implemented in several phases if all of the additional capacity is not needed initially.
- Appropriate lets are given against Service Levels if the business volumes are exceeded.
- The Service Review Forum will periodically review the actual business volumes handled by the system and projected future volumes, to allow sufficient notice to be given to allow any additional capacity to be installed.
- Fujitsu Services shall maintain a capacity model that is shared with Post Office. This allows the impact of changes to be jointly assessed.
- If an error is found in the capacity model or the assumptions on which it is based (see section 4.1) are shown to be invalid, and this has a material consequence, either Party may request an urgent review of the Contracted Volumes and Design Limits it needs to support. Changes to these volumes cannot be unreasonably refused by Post Office, provided that such change does not reduce the Contracted Volumes below the actual volumes at that time.
- If Post Office requests an increase in any Contracted Volume or Design Limit, Fujitsu Services shall not unreasonably withhold or delay its consent to such an increase, subject to Post Office (i) agreeing (by Work Order) to meet all costs reasonably incurred by Fujitsu Services in effecting such increase, and (ii) agreeing to meet (by CCN) any

FUJ00001719



additional ongoing costs reasonably incurred by Fujitsu Services as a direct result of such increase. Having given such consent, Fujitsu Services shall implement such increase as promptly as reasonably practical. If an urgent increase is required within three months or a significant increase is required within nine months of such consent, Fujitsu Services may propose deferral of existing Work Order commitments and amendment of the existing Resource Plan and Post Office shall determine its priorities.

- The costs of increased capacity, including any test kit configuration, are borne by Post Office on the basis described in Schedule 10 ref 7.2.

To achieve this, the following are required:

- An agreed capacity management process - the "Capacity Management Service".
- A documented set of volumes the system should support.
- A capacity model.

This document covers all three items.

The consequences of exceeding the Contracted Volumes and Design Limits are set out in schedule 15. This falls into two basic types:

- Volumes, which if they are exceeded, cause a let in the relevant Service Levels.
- Volumes, which if they are exceeded, require Post Office and Fujitsu Services to look at the cause and see if the Service Levels or Volumes need to be changed.

The majority of volumes fall into the first type. Where the second type applies this is highlighted in the document.

Notifying the author of changes to this document is a joint responsibility but Fujitsu Services will maintain the document and submit updates to Post Office for review and approval.

## 1.5 Phasing of Capacity

Where a new service is rolled out over time, it may be beneficial to phase the installation of additional capacity. This approach avoids having to purchase 100% capacity from day one, which has the advantages that:

- It defers spend on capacity that is not needed initially.
- If the expected transaction volumes do not arise or occur later than expected, it may be possible to avoid or delay having to increase the capacity.

FUJ00001719



- Typically the unit cost of capacity decreases over time. Hence waiting to purchase capacity typically means more capability can be purchased for the same price or the same capacity for a lower price. However this cannot be guaranteed.

If it is decided to roll out capacity over time, the phasing will be included in this document.

For Network Banking and Online Transactions, the following shall apply:

(A) The Contracted Volumes and Design Limits relating to the Network Banking Service shall, save as provided in paragraph (B), be those applicable in respect of Phase 1 (as defined by section 3.7)

(B) In the event that Post Office serves a Phase 2 Notice on the Contractor, the Contracted Volumes, Design Limits for the Network Banking Service shall, with effect from the date specified in the Phase 2 Notice, be those applicable in respect of Phase 2. For the purposes of this paragraph B, a "Phase 2 Notice" shall be a notice in writing given by Post Office to the Contractor specifying a date, at least six months after the date of service of that notice but not earlier than 1 September 2003, on which Post Office requires Phase 2 to commence.

FUJ00001719



# 2.0 Capacity Management Service

This section provides the formal definition of the Capacity Management Service.

## 2.1 Service Summary

The process of managing capacity and the business workload volumes that the Horizon system will support.

## 2.2 Service Principles

Operational staff will be appropriately trained and competent to carry out the services expected of them as described within this document.

## 2.3 Terms and Meanings

In this Section, unless the context otherwise requires, the following terms have the following meanings:

| | |
|---|---|
| Contracted Volumes | Each of the levels defined in section 3.0 of this document |
| Design Limit | Each of the levels defined in section 3.0 of this document |
| Phase 1 | As defined in section 3.7 of this document |
| Phase 2 | As defined in section 3.7 of this document |

Terms defined in the Agreement shall have the same meaning where used in this CCD.

## 2.4 Service Definition

(A) Fujitsu Services shall monitor the actual volumes as against the volumes specified in this CCD and shall report such numbers and resulting trends at each meeting of the Service Management Forum. The frequency of such reporting shall be agreed by the Service Management Forum. The Service Management Forum shall also review volume forecasts and may in the light of such reports, recommend changes that may be required. The parties shall agree volumes, trends and/or peak thresholds which, if they occur or are exceeded in live operation, shall be reported by Fujitsu Services to the Service Management Forum.

(B) Fujitsu Services shall produce and maintain a capacity model of the system. The assumptions, inputs, calculations and outputs of the model shall be shared with, and used by, for the purposes of capacity planning only, the Post Office members of the Joint Architecture Forum and such other Post Office employees and professional advisors as reasonably require access to such information. In the event that such information is disclosed by Post Office or

FUJ00001719



(at Post Office's request) by Fujitsu Services to Post Office's professional advisors, Post Office shall procure that such professional advisors shall comply with the restrictions contained in Clause 50 of the Agreement. For the avoidance of doubt, the disclosure of such information shall not and shall not be deemed to transfer any Intellectual Property Rights of Fujitsu Services in such information to any of Post Office, its employees or its professional advisors.

The first version of the model produced before the signing of the contract amendment covers the major systems. Additional components may be added later as required to provide, as far as is reasonably practicable, a quantified understanding of system performance characteristics as they relate to technical parameters such as Dial-Up Transaction Volumes

(C) Fujitsu Services shall use reasonable endeavours to optimise the capacity of the Horizon Service Infrastructure so as to minimise the need for any future cost increase.

(D) As part of the Feasibility Assessment Stage for any changes, Post Office shall provide initial business volumes and transaction details. From these Fujitsu Services shall produce indicative capacity usage and indicative costs for any infrastructure changes required.

E) As part of the Requirements and Analysis Stage, Post Office shall produce final volumes, which Fujitsu Services shall use to update this document. The reason for changes to the infrastructure to support the business volumes and other changes shall be included in the Design Proposal, including any quantification needed to provide transparency.

(F) In the event that Post Office requires a Contracted Volume or a Design Limit to be increased it shall only be increased where such increase (and the amount of any additional equipment required and/or the re-allocation of any system capacity or equipment) has been agreed, through the Change Control Procedure. The impact of any such changes shall be reviewed by the Joint Architecture Forum.

## 2.5 Service Availability

The Capacity Management Service shall be available 09:00 to 17:30 Monday to Friday excluding Bank Holidays.

## 2.6 Service Dependencies and Post Office Responsibilities

(A) On request, Post Office shall use reasonable endeavours to supply information to assist in the capacity management of the Horizon system (e.g. introduction of New Services, data to help update to this document or the capacity model). Such information should only be required on an ad-hoc basis and may include, but not be limited to, workload breakdown by Branch or workload breakdown by product by time.

(B) Post Office shall co-operate with Fujitsu Services in the assessment of future transaction types and volumes.

FUJ00001719

FUJ00001719



# 3.0 Business Metrics

This section describes the business metrics that the Horizon system will support and is broken down by service type or functional area. The demand on the infrastructure generated by the Horizon workload is not uniform and different parts of the system need to handle the volumes generated over different periods of time. This means that the volumes need to consider different time periods as shown below:

| Period | Definition | Used For |
|---|---|---|
| Month | The total business volume in the busiest month of the year. | Sizing storage capacity<br>E.g., correspondence server storage, DRSH storage. |
| Week | The total business volume in the busiest week of the year. | Sizing storage capacity<br>E.g. data warehouse weekly data |
| Two Days | The total business volume in the busiest two consecutive days of the year. | Sizing storage capacity<br>E.g. Overnight host processing - the Host must be capable of storing and processing two days data if a major failure occurs and overnight processing is delayed by a day |
| Day | The total business volume in the busiest day of the month. | Sizing components that need to support the full day load.<br>E.g. overnight batch processing |
| Hour | The total business volume in the busiest hour of the month. | Sizing components that need to keep up during the day but do not need to support the peak 5 minutes.<br>E.g. DRSH |
| 5 Minutes | The aggregate business over the peak 5 minute period of the month, expressed as a per second rate | Sizing components that need to support on line transactions.<br>E.g. WAN, VPN Servers, Correspondence Servers etc |

For each area, the following volumes are given:

- Historical Peak - the peak volumes actually processed by the Horizon Service Infrastructure. These are either actual values or estimates based on profiles.
- Contracted Volumes - the maximum volumes that Fujitsu Services will contract to support. Exceeding these volumes will cause given Service Levels to automatically not apply (see Schedule 15 for details).
- Design Limits - the volumes that the system will support without significant failures. Exceeding these volumes could cause any Service Level or other obligation not to apply (see Schedule 15 for details).

In addition, other areas of concern are covered for each service where appropriate.

FUJ00001719



## 3.1 EPOSS

There are two parts of EPOSS, the processing of Products and the handling of Settlements.

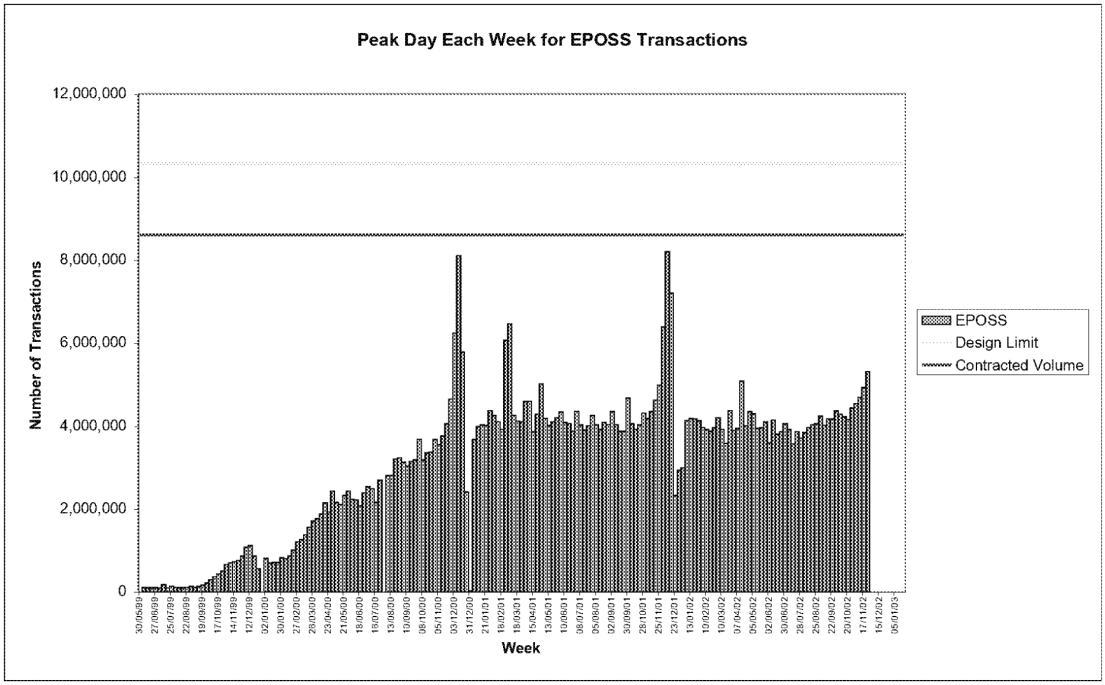
### 3.1.1 Products

EPOSS Product volumes have been fairly consistent over 2001 and 2002 and are not expected to grow significantly in subsequent years. The Contracted Volumes are therefore set at 5% above the Historical Peak with the Design Limits set at 20% above this.

The Historical Volumes are taken from actual volumes for the Peak Month, Peak Week, Peak 2 Days and Peak Day. For Peak Hour and Peak 5 Minutes the Historical Peak volumes are calculated from the Peak Day and a known profile.

| Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Peak Month | 100,195,596 | 105,205,376 | 126,246,451 |
| Peak Week | 33,637,564 | 35,319,442 | 42,383,331 |
| Peak 2 Days | 14,876,498 | 15,620,323 | 18,744,387 |
| Peak Day | 8,192,874 | 8,602,518 | 10,323,021 |
| Peak Hour | 1,171,581 | 1,230,160 | 1,476,192 |
| 5 Minutes (Per Sec) | 328 | 344 | 413 |

The graph below shows the Peak Day each week together with the Contracted Volumes and Design Limits.



FUJ00001719



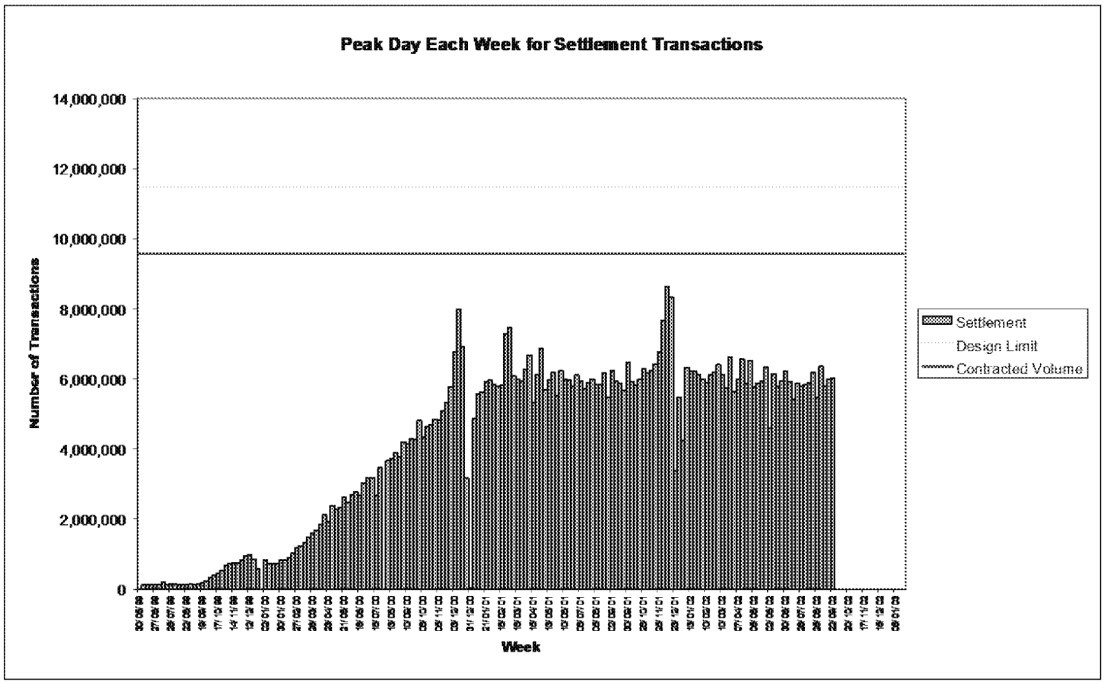
### 3.1.2 Settlements

Settlement transactions are generated by the Horizon system when the customer session is settled. They record the payment of cash to the customer or the receipt of cash or cheque by the Branch.

For Settlements, all volumes are estimated, as historical volumes are not available. The formula used is that for each Product sold (APS, OBCS or EPOSS) there is 0.6 settlements are generated (alternatively for each Settlement there are 1.7 Products sold). The Contracted Volumes are above the Historical Peak as it is assumed the growth in APS transactions causes an increase in customers

| Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Peak Month | 114,447,220 | 119,631,436 | 143,557,723 |
| Peak Week | 34,644,173 | 36,112,618 | 43,335,142 |
| Peak 2 Days | 16,470,811 | 17,188,486 | 20,626,183 |
| Peak Day | 9,179,138 | 9,565,842 | 11,479,010 |
| Peak Hour | 1,658,719 | 1,730,259 | 2,076,311 |
| 5 Minutes (Per Sec) | 509 | 532 | 638 |

The graph below shows the peak day each week together with the Contracted Volumes and Design Limits.



FUJ00001719



## 3.2 APS

There are two aspects of the APS Service that need to be considered: transaction volumes and client volumes.

### 3.2.1 Transactions

APS is a rapidly growing service. Over the last few years, the annual growth has been 10% per year (compound) and it is assumed that this will continue. This growth excludes the move of DVLA V11 from an EPOSS Product to an APS one as this was a one-off activity (e.g. including V11, July 2002 was 18.5% larger than July 2001). . The Contracted Volumes are set at the expected volumes in March 2005, which is 27% above the Historical Peak. The Design Limits are set at 20% above the Contracted Volumes.

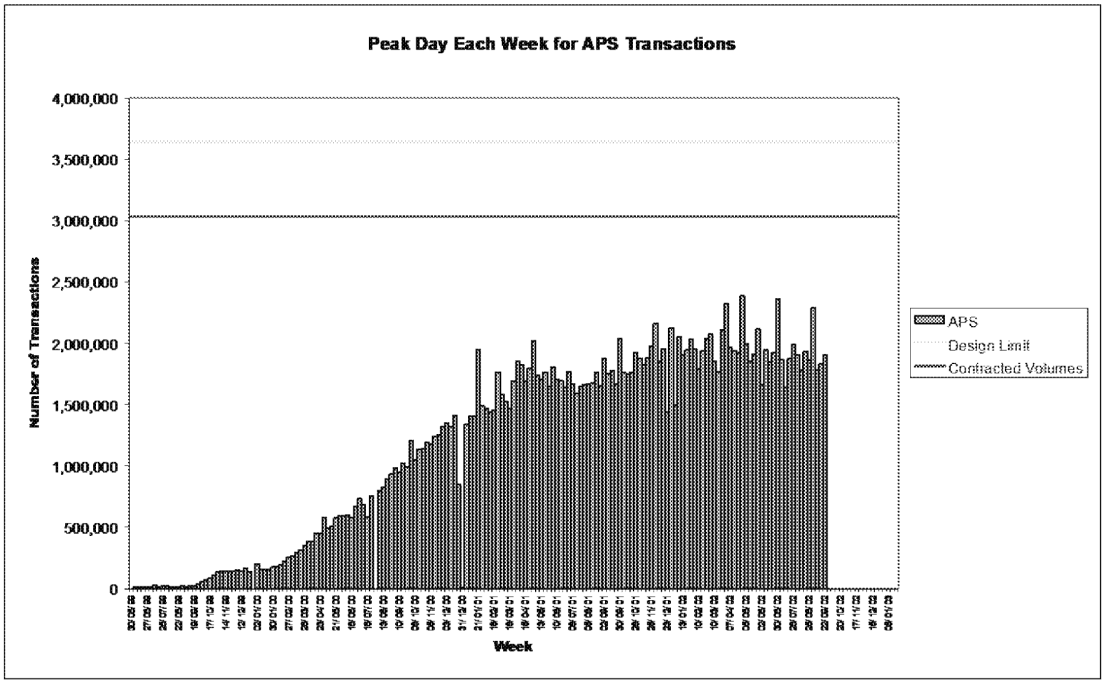
The Historical Peak volumes are taken from actual volumes for the Peak Month, Peak Week, Peak 2 Days and Peak Day. For Peak Hour and Peak 5 Minutes the Historical Peak volumes are calculated from the Peak Day and a known profile.

| Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Peak Month | 32,001,334 | 40,641,694 | 48,770,033 |
| Peak Week | 9,064,479 | 11,511,888 | 13,814,266 |
| Peak 2 Days | 4,430,096 | 5,626,222 | 6,751,466 |
| Peak Day | 2,387,065 | 3,031,573 | 3,637,887 |
| Peak Hour | 441,607 | 560,841 | 673,009 |
| 5 Minutes (Per Sec) | 141 | 179 | 215 |

The graph below shows the peak day each week together with the Contracted Volumes and Design Limits.

FUJ00001719






### 3.2.2 Clients

The number of clients being supported by APS is also important, as a file needs to be produced and transferred for each client. There are three client types that need to be considered:

- Large Clients - those that process more than 5% of the total workload, measured monthly. These are currently DVLA, BT, Quantum and BBC/TVL. They need special consideration due to the size of files produced.
- Small Clients - those that process less than 5% of the total workload, measured monthly.
- Girobank Clients - those clients processed by Girobank.

The table below shows the number of clients that can be supported.

| Peak Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Large Clients | 4 | 6 | 10 |
| Small | 22 | 30 | 36 |
| Girobank Clients | 500 | 600 | 720 |

If these volumes are exceeded, Post Office and Fujitsu Services will look at the cause and see if the Service Levels or Volumes need to be changed (see schedule 15 for details).

FUJ00001719



## 3.3 OBCS

OBCS is expected to decline over 2003 and 2004 as Network Banking replaces it as the way benefit payments are made. Therefore three sets of numbers are given:

- Volumes with no Network Banking rolled out. For these the Contracted volumes are therefore set at the Historical Peak with the Design Limits set at 20% above this.
- Volumes with 50% of Network Banking (see section 3.7) rolled out - defined as 20.9M transactions per month. It is assumed at this point that OBCS is 60% of current volumes.
- Volumes with Network Banking (see section 3.7) fully rolled out - defined as 41.8M transactions per month. It is assumed at this point that OBCS is 5% of current volumes.

During the transition periods, it is assumed that OBCS declines in proportion to Network Banking Increasing.

The Historical Peak volumes are taken from actual volumes for the Peak Month, Peak Week, Peak 2 Days and Peak Day. For Peak Hour and Peak 5 Minutes the Historical Peak volumes are calculated from the Peak Day and a known profile.

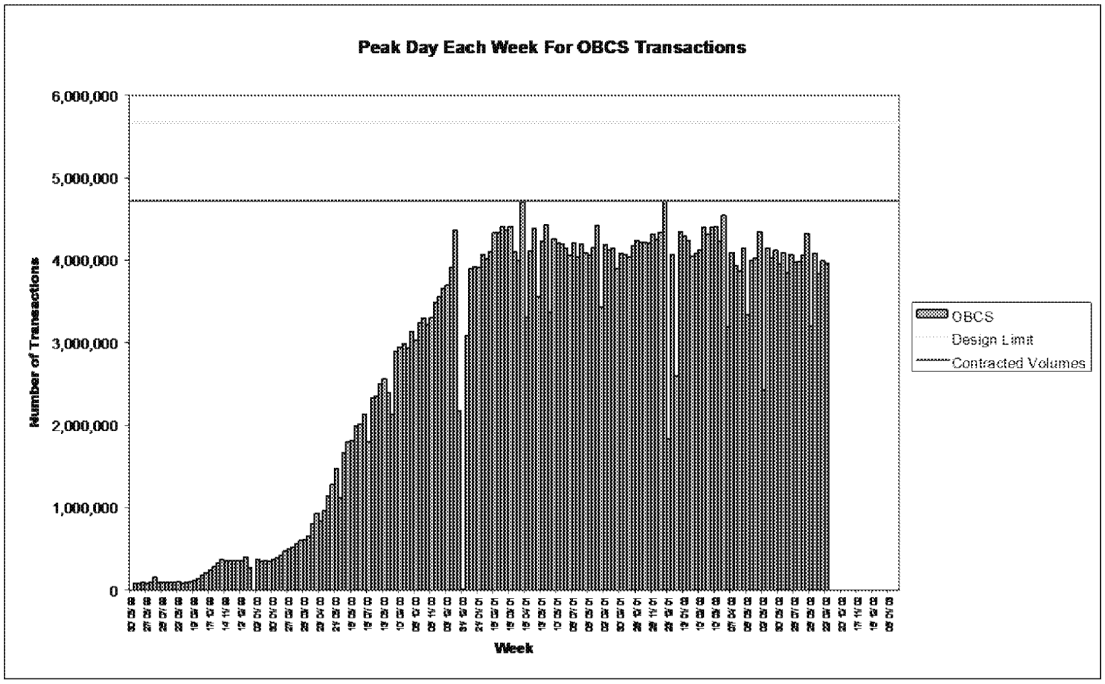
### 3.3.1 With No Network Banking

| Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Peak Month | 58,548,437 | 58,548,437 | 70,258,124 |
| Peak Week | 15,038,246 | 15,038,246 | 18,045,895 |
| Peak 2 Days | 8,144,758 | 8,144,758 | 9,773,710 |
| Peak Day | 4,718,625 | 4,718,625 | 5,662,350 |
| Peak Hour | 1,151,345 | 1,151,345 | 1,381,613 |
| 5 Minutes (Per Sec) | 380 | 380 | 456 |

The graph below shows the peak day each week together with the Contracted Volumes and Design Limits.

FUJ00001719






### 3.3.2 With 50% Network Banking Rolled Out

These are the volumes of OBCS that will be supported once Network Banking is 50% rolled out as defined above

| Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Peak Month | 58,548,437 | 35,129,062 | 42,154,875 |
| Peak Week | 15,038,246 | 9,022,948 | 10,827,537 |
| Peak 2 Days | 8,144,758 | 4,886,855 | 5,864,226 |
| Peak Day | 4,718,625 | 2,831,175 | 3,397,410 |
| Peak Hour | 1,151,345 | 690,807 | 828,968 |
| 5 Minutes (Per Sec) | 380 | 228 | 274 |

### 3.3.3 With Network Banking Fully Rolled Out

These are the volumes of OBCS that will be supported once Network Banking is fully rolled out as defined above

| Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Peak Month | 58,548,437 | 2,927,422 | 3,512,906 |
| Peak Week | 15,038,246 | 751,912 | 902,295 |
| Peak 2 Days | 8,144,758 | 407,238 | 488,685 |
| Peak Day | 4,718,625 | 235,931 | 283,118 |
| Peak Hour | 1,151,345 | 57,567 | 69,081 |
| 5 Minutes (Per Sec) | 380 | 19 | 23 |

FUJ00001719



## 3.4 LFS

LFS is a low volume service to support stock and cash ordering in the Branches. For this reason, only the Peak Day numbers are appropriate.

There are a number of different components for LFS. These are covered separately in the table.

| Item | Historical Peak - Peak Day | Contracted Volume - Peak Day | Design Limit - Peak Day |
|---|---|---|---|
| Planned Orders | 17,050 | 20,000 | 24,000 |
| Advice Notices | Not Used | 10,000 | 12,000 |
| Pouch Collection | 3,506 | 10,000 | 14,000 |
| Pouch Delivery | 6,407 | 20,000 | 24,000 |
| Cash Declaration | 17,313 | 20,000 | 24,000 |
| Stock Declaration | 17,050 | 20,000 | 24,000 |

## 3.5 Message Broadcast

Message Broadcast is a low volume service that allows messages to be sent on behalf of Post Office to the Branches. For this reason, only the Peak Day numbers are appropriate. In any given day, there will be a number of messages, each being sent to one or more Branches. The table below shows the maximum number of "Branch messages" that can be supported (the same message being sent to N Branches counts as N "Branch messages").

| Peak Day Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Branch Messages | - | 100,000 | 120,000 |

## 3.6 Reference Data

This section covers reference data volumes.

### 3.6.1 Reference Data Distribution

Reference Data is much more difficult that the other services as the relationship between the business change and the impact on capacity is complex due to the large number of different types of changes and the variability in the number of Branches these are targeted at.

For this reason, rather than providing the level of business change that can be supported, the maximum number of reference data messages (i.e. Riposte messages inserted into the correspondence servers) that can be distributed each night to the Branches is defined. Fujitsu Services will continue the current practice of working with Post Office to ensure that the

FUJ00001719



level of business change does not exceed these values and advise on scheduling of distribution to the estate.

There are three types of reference data that need to be considered:

- Branch Targeted - this is data targeted at one or more Branches rather than distributed to the whole estate (either by Tivoli, APS or RDDS). It is either Branch specific (e.g. an address) or non-core data (e.g. DVLA product which is only sold in the larger Branches). This volume is the average messages per outlet (e.g. if 170,000 messages are sent to an estate of 17,000 Branches this would be 10).
- Core Replicated - This is data sent to all Branches in the estate via a replication method (i.e. the data is copied into each Branch separately by a set of agents, having been first loaded via RDDS, APS or Tivoli into a dummy Branch). Examples include core reference data and APS tariff data.
- Global - This is data sent to all Branches in the estate without replicating it to each Branch (i.e. the correspondence servers do it themselves). This is a new method and is currently only being used for MAILS data.

The Contracted Volumes and Design Limits are shown in the table below. Only Peak Day volumes are covered, as only the overnight batch is significant.

| Peak Day Volume | Historical Peak | Contracted Volume | Design Limit |
|---|---|---|---|
| Branch Targeted (average per Branch) | - | 25 | 30 |
| Core Replicated (per Branch) | - | 250 | 300 |
| Global (per Branch) | - | 1,000 | 1,500 |

If these volumes are exceeded, Post Office and Fujitsu Services will look at the cause and see if the Service Levels or Volumes need to be changed (see schedule 15 for details).

### 3.6.2 Token Definitions

The number of token definitions defined for each service can have an impact on the counter transaction time for its own and other services. This is because when a card is swiped or a bar code scanned, the counter code needs to search its list of tokens for a match. The table below shows the number that can be supported for each service and the impact of increasing this.

| Service | Contracted Volume | Design Limit | Other Services Impacted by an Increase |
|---|---|---|---|
| LFS (tokens) | 20 | 30 | APS, OBCS, NBS and DC |
| APS (tokens) | 1600 | 2000 | OBCS, NBS and DC |
| OBCS (tokens) | 20 | 30 | NBS and DC |

FUJ00001719



| | | | |
|---|---|---|---|
| NBS and DC Combined (IIN Ranges) | 1600 | 2000 | |

If these volumes are exceeded, Post Office and Fujitsu Services will look at the cause and see if the Service Levels or Volumes need to be changed (see schedule 15 for details).

## 3.7 Network Banking Service

NBS is a service to provide a service to both:

- Existing benefit customers who will be paid through the NBS rather than OBCS and
- New (non benefit) customers accessing the services provided by the NBS .

The number of benefit customers serviced by Post Office once NBS is in place is predicted to be lower than the number serviced under OBCS. This is due to some customers choosing not to collect their benefit from the post office if it is paid directly into their bank accounts.

The load generated on the Fujitsu Services infrastructure by NBS is significantly different to that of other services due to the high level of online transactions.

The rate of growth of NBS is driven by:

1. The take-up rate of the service by personal banking customers and CAPO™ customers
2. The rate at which CAPO™ cards are to be issued and the number of such cards
3. The replacement rate of benefit payment books by cards.

Post Office Ltd. has predicted the future workload volumes but the process for the introduction of infrastructure capacity recognises that there are variables in the workload volumetrics and allows for planned change through the Capacity Management Service.

As agreed with Post Office (see the NBS pricing in Annex D to Schedule 10) capacity is being installed in two phases for Network Banking:

- Phase 1 - These volumes (sized at 50% of final volumes) are used for all components from the start of the service.
- Phase 2 - These volumes are used for all components six months after PO Ltd has given notice that it needs Fujitsu Services to support these volumes, such notice to be given no earlier than 1st March 2003.

The expected areas of change at phase 2 include:

- Increased processing power for the correspondence servers and potentially a new version of WebRiposte to improve connection concurrency handling.

FUJ00001719



- Increased processing power for the NBS agents
- Increased storage for the DRS
- Increased processing power for the DRS Host

### 3.7.1 Phase 1 Transaction Volumes

For Phase 1 the system will support the volumes below:

| Volume | Contracted Volume | Design Limit |
|---|---|---|
| Peak Month | 20,923,780 | 25,108,536 |
| Peak Week | 5,480,016 | 6,576,019 |
| Peak 2 Days | 2,828,379 | 3,394,055 |
| Peak Day | 1,632,090 | 1,958,508 |
| Peak Hour | 347,488 | 416,986 |
| 5 Minutes (Per Sec) | 111 | 133 |

### 3.7.2 Phase 2 Transaction Volumes

For Phase 2 the system will support the volumes below:

| Volume | Contracted Volume | Design Limit |
|---|---|---|
| Peak Month | 41,847,560 | 50,217,072 |
| Peak Week | 10,960,032 | 13,152,039 |
| Peak 2 Days | 5,656,759 | 6,788,111 |
| Peak Day | 3,264,181 | 3,917,017 |
| Peak Hour | 694,976 | 833,971 |
| 5 Minutes (Per Sec) | 222 | 267 |

### 3.7.3 Routing Gateways

The DRSH has the concept of "Routing Gateways", which are defined by reference data for a particular IIN/operation combination. These are used to group transactions into separate reports.

The reconciliation report structure, in agreement with Post Office Ltd, has assumed a maximum number of routing gateways. The Contracted Volume and Design Limit for this is 30 routing gateways.

If these volumes are exceeded, Post Office and Fujitsu Services will to look at the cause and see if the Service Levels or Volumes need to be changed (see schedule 15 for details).

Each routing gateway produces up to 11 daily reports and 2 weekly reports from the DRS. There are also 2 daily reports for covering all gateways.With 30 gateways in operation the table below shows the maximum number of reports:

FUJ00001719



| Day | Total Reports |
|---|---|
| Normal Weekday (not Monday) | 332 |
| Monday (not Bank Holiday) | 1056 |
| Tuesday after B.H. Monday | 1388 |
| Tuesday after Easter | 1720 |

## 3.8 Debit Card

Debit Card is a new addition to the Horizon system so that a customer in addition to paying by cash or cheque could now do so by Card.

It is predicted that the customer behaviour that determines the distribution of DC payments over the day will be similar to that for EPOSS transactions. The key difference between DC and other services is that Saturdays are expected to be busier than weekdays.

The predicted Saturday peak results from a series of variable events occurring on the same day e.g.:

- Month end resulting in a significant increase in MVL payments and
- Large utility companies issuing quarterly bills

The system will support the volumes below:

| Volume | Contracted Volume | Design Limit |
|---|---|---|
| Peak Month | 4,210,000 | 5,052,000 |
| Peak Week | 1,264,768 | 1,517,721 |
| Peak 2 Days | 565,949 | 679,139 |
| Peak Day | 288,425 | 346,110 |
| Peak Hour | 79,368 | 95,242 |
| 5 Minutes (Per Sec) | 22 | 26 |

## 3.9 Online Transactions

### 3.9.1 Introduction

Online Transactions need to be considered as a generic transaction type in addition to the individual services that make them up. This is because Online Transactions cause load on the central systems and the Branch to data centre network. These two areas are covered separately.

There are three services that generate Online Transactions:

1. OBCS Foreigns (OBCS transactions taking place at a Branch which the customer has not previously visited) - this is expected to decline as Network Banking rolls out

FUJ00001719



2. Network Banking Service
3. Debit Card

### 3.9.2 Central Systems

These volumes are used to size components that process and store Online Transactions in a common way in the central systems (e.g. Correspondence servers). The Branch to data centre network is explicitly excluded from this subsection and is covered separately.

As with the Network Banking Service, the capacity is split into two phases.

Note that the volumes in this section do not necessarily match the sum of the Debit Card and Network Banking volumes from previous sections. This is because the peaks from NBS and DC are expected to happen at different times.

#### 3.9.2.1 Phase 1

For Phase 1 the system will support the volumes below:

| Volume | Contracted Volume | Design Limit |
|---|---|---|
| Peak Month | 23,555,716 | 28,266,859 |
| Peak Week | 6,247,744 | 7,497,293 |
| Peak 2 Days | 3,184,657 | 3,821,588 |
| Peak Day | 1,818,771 | 2,182,525 |
| Peak Hour | 379,436 | 455,323 |
| 5 Minutes (Per Sec) | 120 | 145 |

#### 3.9.2.2 Phase 2

For Phase 2 the system will support the volumes below:

| Volume | Contracted Volume | Design Limit |
|---|---|---|
| Peak Month | 46,101,471 | 55,321,766 |
| Peak Week | 12,236,079 | 14,683,294 |
| Peak 2 Days | 6,228,817 | 7,474,580 |
| Peak Day | 3,556,145 | 4,267,374 |
| Peak Hour | 739,012 | 886,814 |
| 5 Minutes (Per Sec) | 234 | 281 |

### 3.9.3 Branch to Data Centre Network

As NBS and DC roll out, the capacity of the network will be increased to meet the growth in demand. This is achieved by moving more Branches onto fixed connections. The factor that forces this behaviour is that there is a limit to the rate of ISDN calls being established (the "call attack rate") that the network can support. Hence the need to ensure that the workload generated by the Branches that dial on demand is less than the call attack rate that the network can support.

Since fixed connections are more expensive than dial on demand ones, there is a straight trade off between the network capacity and the network cost.

FUJ00001719



This section has changed significantly from [NewBusVols] to reflect the change in network charges from variable charges to fixed charges as set out in Schedule 10. Rather than provide rules on how the network capacity will be jointly managed (as in [NewBusVols]), the peak volume of Online Transactions that will be supported in each month by the capacity which equates to the Schedule 10 charges is now stated in the second table below. Post Office can increase that capacity by paying upgrade charges as set out in Schedule 10.

Each month has 4 different time periods (shown in the first table below) reflecting the three periods in [NewBusVols] plus the use of "Silver Part Time connections". The volumes for Period 1 are taken from [AllocProcess]. As with the key network numbers in [NewBusVols], there is no difference between the Contracted Volumes and Design Limits.

The network is able to support different capacities at different times of the day or day of week. There are 4 time periods for online transactions as defined by the table below:

| Day | Period 1 | Period 2 | Period 3 | Period 4 |
|---|---|---|---|---|
| Mon | 08:30 to 10:30 | - | 08:00 to 08:30 & 10:30 to 17:30 | 00:00 to 08:00 & 17:30 to 23:59 |
| Tue | 08:30 to 09:30 | 09:30 to 10:30 | 08:00 to 08:30 & 10:30 to 17:30 | 00:00 to 08:00 & 17:30 to 23:59 |
| Wed | - | 08:30 to 10:30 | 08:00 to 08:30 & 10:30 to 17:30 | 00:00 to 08:00 & 17:30 to 23:59 |
| Thu | 08:30 to 09:30 | 09:30 to 10:30 | 08:00 to 08:30 & 10:30 to 17:30 | 00:00 to 08:00 & 17:30 to 23:59 |
| Fri | - | 08:30 to 10:30 | 08:00 to 08:30 & 10:30 to 17:30 | 00:00 to 08:00 & 17:30 to 23:59 |
| Sat | - | 08:30 to 10:30 | 08:00 to 08:30 & 10:30 to 13:00 | 00:00 to 08:00 & 13:00 to 23:59 |
| Sun | - | - | - | 00:00 to 23:59 |

The network capacity will be increased over time to support the assumed increase in Online Transaction volumes. The table below gives the Peak 5 minute Contracted Volumes for Online Transactions expressed in transactions per second:

| Month | Period 1 | Period 2 | Period 3 | Period 4 |
|---|---|---|---|---|
| Jan-03 | 25 | 16 | 12 | 5 |
| Feb-03 | 50 | 33 | 24 | 5 |
| Mar-03 | 50 | 33 | 24 | 5 |
| Apr-03 | 50 | 33 | 24 | 5 |
| May-03 | 50 | 33 | 24 | 5 |
| Jun-03 | 50 | 33 | 24 | 5 |
| Jul-03 | 53 | 35 | 26 | 5 |
| Aug-03 | 76 | 49 | 36 | 5 |
| Sep-03 | 87 | 57 | 42 | 5 |
| Oct-03 | 105 | 68 | 51 | 5 |
| Nov-03 | 118 | 77 | 57 | 5 |
| Dec-03 | 130 | 84 | 62 | 5 |
| Jan-04 | 152 | 99 | 73 | 5 |
| Feb-04 | 162 | 105 | 78 | 5 |
| Mar-04 | 172 | 112 | 83 | 5 |
| Apr-04 | 182 | 118 | 87 | 5 |

FUJ00001719



| | | | | |
|---|---|---|---|---|
| May-04 | 188 | 122 | 91 | 5 |
| Jun-04 | 197 | 128 | 95 | 5 |
| Jul-04 | 206 | 134 | 99 | 5 |
| Aug-04 | 210 | 136 | 101 | 5 |
| Sep-04 | 217 | 141 | 104 | 5 |
| Oct-04 | 225 | 146 | 108 | 5 |
| Nov-04 | 228 | 148 | 110 | 5 |
| Dec-04 | 232 | 151 | 112 | 5 |
| Jan-05 | 233 | 152 | 112 | 5 |
| Feb-05 | 236 | 154 | 114 | 5 |
| Mar-05 | 236 | 154 | 114 | 5 |
| After Mar-05 | 236 | 154 | 114 | 5 |

The Design Limits for Online Transactions are the same as the Contracted Volumes.

The ADSL branch network shall support at least the volumes defined in the table above.

In calculating the numbers in the table above, the following method has been used:

| Period | Method |
|---|---|
| 1 | During this period the online transaction volumes are supported by Dialled Connections and daytime silver and part-time silver Branches.<br><br>The peak second volumes by month are as approved by Post Office in [AllocProcess]. The working behind these numbers is included in section 5. |
| 2 | During this period the online transaction volumes are supported by Dialled Connections and daytime silver Branches, but not part-time silver Branches.<br><br>These values are 65% of Period 1. This equates to the impact of removing 1200 part time silver Branches.<br><br>This impact is illustrated in [AllocSheet] which shows that 11,400 silver Branches are needed to support the peak March 2005 volumes, whereas 10,200 silver Branches can only support the January 2004 volumes. The ratio of these two volumes is 152/236=65%, this being the factor used to calculate the Period 2 volumes. |
| 3 | During this period the online transaction volumes are supported by Dialled Connections and daytime silver Branches, but not part-time silver Branches. However fewer online transactions can be supported than Period 2, as there are regular Riposte synchronisations that also need to take place.<br><br>In [NewBusVols] this difference was allowed for by having two different dial rates during the day:<br>• "5 Minute Dialled Transaction Rate - Period 1 (per second)" of 13.5 transactions per second<br>• "5 Minute Dialled Transaction Rate - Period 2 (per second)" of 10 transactions per second<br><br>This same ratio (i.e. 10/13.5 = 74%) has been applied to the Period 2 volumes to calculate the volumes in Period 3. |

FUJ00001719



| | |
|---|---|
| 4 | This period equates to the "5 Minute Dialled Transaction Rate - Period 3 (per second)" in [NewBusVols]. Since there are no silver branches during this period, the rate of 5 transactions per second is used. |

## 3.10 Post Offices

The number of Post Office Branches and counters is shown in the following table. This is provided for information only and represents the current forecast - the contractual baseline is given in Schedule 10. At this version of the document the two sets of numbers are the same.

| Month | Branches | Counters |
|---|---|---|
| Jan-03 | 17,279 | 40,127 |
| Feb-03 | 17,258 | 40,077 |
| Mar-03 | 17,236 | 40,028 |
| Apr-03 | 17,215 | 39,978 |
| May-03 | 17,194 | 39,929 |
| Jun-03 | 17,112 | 39,819 |
| Jul-03 | 17,031 | 39,709 |
| Aug-03 | 16,949 | 39,599 |
| Sep-03 | 16,867 | 39,489 |
| Oct-03 | 16,786 | 39,380 |
| Nov-03 | 16,704 | 39,270 |
| Dec-03 | 16,623 | 39,160 |
| Jan-04 | 16,541 | 39,050 |
| Feb-04 | 16,459 | 38,940 |
| Mar-04 | 16,378 | 38,896 |
| Apr-04 | 16,296 | 38,852 |
| May-04 | 16,214 | 38,808 |
| Jun-04 | 16,133 | 38,764 |
| Jul-04 | 16,051 | 38,720 |
| Aug-04 | 15,970 | 38,676 |
| Sep-04 | 15,888 | 38,632 |
| Oct-04 | 15,806 | 38,589 |
| Nov-04 | 15,725 | 38,545 |
| Dec-04 | 15,643 | 38,501 |
| Jan-05 | 15,562 | 38,457 |
| Feb-05 | 15,480 | 38,413 |
| Mar-05 | 15,398 | 38,369 |
| Apr-05 | 15,317 | 38,325 |
| May-05 | 15,235 | 38,281 |
| Jun-05 | 15,154 | 38,237 |
| Jul-05 | 15,072 | 38,193 |
| Aug-05 | 14,990 | 38,149 |
| Sep-05 | 14,909 | 38,105 |
| Oct-05 | 14,827 | 38,061 |
| Nov-05 | 14,745 | 38,017 |
| Dec-05 | 14,664 | 37,973 |
| Jan-06 | 14,582 | 37,929 |

FUJ00001719



| | | |
|---|---|---|
| Feb-06 | 14,501 | 37,885 |
| Mar-06 | 14,419 | 37,841 |
| Apr-06 | 14,337 | 37,797 |
| May-06 | 14,256 | 37,753 |
| Jun-06 | 14,174 | 37,709 |
| Jul-06 | 14,093 | 37,665 |
| Aug-06 | 14,011 | 37,621 |
| Sep-06 | 13,929 | 37,577 |
| Oct-06 | 13,848 | 37,533 |
| Nov-06 | 13,766 | 37,490 |
| Dec-06 | 13,684 | 37,446 |
| Jan-07 | 13,603 | 37,402 |
| Feb-07 | 13,521 | 37,358 |
| Mar-07 | 13,505 | 37,350 |
| Apr-07 | 13,488 | 37,343 |
| May-07 | 13,471 | 37,336 |
| Jun-07 | 13,455 | 37,329 |
| Jul-07 | 13,438 | 37,322 |
| Aug-07 | 13,422 | 37,315 |
| Sep-07 | 13,405 | 37,307 |
| Oct-07 | 13,388 | 37,300 |
| Nov-07 | 13,372 | 37,293 |
| Dec-07 | 13,355 | 37,286 |
| Jan-08 | 13,339 | 37,279 |
| Feb-08 | 13,322 | 37,271 |
| Mar-08 | 13,305 | 37,264 |
| Apr-08 | 13,289 | 37,257 |
| May-08 | 13,272 | 37,250 |
| Jun-08 | 13,256 | 37,243 |
| Jul-08 | 13,239 | 37,236 |
| Aug-08 | 13,222 | 37,228 |
| Sep-08 | 13,206 | 37,221 |
| Oct-08 | 13,189 | 37,214 |
| Nov-08 | 13,173 | 37,207 |
| Dec-08 | 13,156 | 37,200 |
| Jan-09 | 13,140 | 37,192 |
| Feb-09 | 13,123 | 37,185 |
| Mar-09 | 13,106 | 37,178 |
| Apr-09 | 13,090 | 37,171 |
| May-09 | 13,073 | 37,164 |
| Jun-09 | 13,057 | 37,157 |
| Jul-09 | 13,040 | 37,149 |
| Aug-09 | 13,023 | 37,142 |
| Sep-09 | 13,007 | 37,135 |
| Oct-09 | 12,990 | 37,128 |
| Nov-09 | 12,974 | 37,121 |
| Dec-09 | 12,957 | 37,114 |
| Jan-10 | 12,940 | 37,106 |
| Feb-10 | 12,924 | 37,099 |
| Mar-10 | 12,907 | 37,092 |

FUJ00001719



# 4.0 Capacity Model Summary

This section provides a summary of the capacity model. It only covers the critical components and more detail can be found in the model.

The model itself is quite complex, as each part of the infrastructure needs to be considered in turn and each component has several aspects to capacity (e.g. processor usage, memory usage or disk storage). The first version only covers the critical systems and will be extended as required. The consequences of errors in the model or the assumptions are given in section 1.4.

## 4.1 Assumptions

The key assumptions used by the model are given below by type.

Workload / Business Processes:

- APS Smart Card Transactions (e.g. Quantum) account for 10% of all APS Transactions (from historic data)
- A receipt is printed for 5% of Settlements.
- 2 Receipts are printed for all APS transactions (one office and one customer copy).
- 1 Receipt is printed for all NBS Transactions (one customer only - no office copy). It is assumed the number of Non-PIN based transactions (which require two receipts) is negligible.
- 2 Receipts are printed for all DC Transactions (one office and one customer copy).
- Only serve customer transactions occur during the peak 5 minutes of the week (i.e. during the peak 5 minutes there are no logon/logoff and no back office functions such as LFS pouch receipt, cash accounts, other reports etc).
- The peak 5 minutes of the different serve customer transactions happen at the same time.

Computer System:

- The workload is split into 4 Riposte clusters, which are not perfectly balanced. The busiest cluster handles 28% of the total workload.
- The average Riposte message size is 510 bytes excluding network overheads.
- No more than 3 Riposte subscription groups are used.

Data Retention Summary (these values are defined elsewhere in the contract or other documents, but are included for completeness):

- Riposte messages are kept for 35 days within the correspondence servers.
- DRS data is kept online for 90 days
- Audit data is kept for 7 years

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## 4.2 Day Online Load

The load on the system during the day is dominated by handling the peak 5-minute workload. Each business transaction is converted into one or more Riposte messages as shown by the table below. The number of transactions produced for three scenarios is also given:

- BI3 - This is immediately after BI3 has gone live, but before Network Banking has started to be used. At this point the infrastructure has to handle 6,500 concurrent Branch connections.
- NBS Phase 1 - This is once the full NBS Phase 1 volumes are being supported. At this point the infrastructure has to handle 10,500 concurrent Branch connections.
- NBS Phase 2 - This is once the full NBS Phase 2 volumes are being supported. At this point the infrastructure has to handle 12,500 concurrent Branch connections.

| Service | EPOSS | APS | OBCS | NBS | DC | Settlement | **Total** |
|---|---|---|---|---|---|---|---|
| Riposte Messages per Txn | 1 | 7.2 | 1 | 7 | 9 | 1.1 | - |
| BI3 Transactions | 344 | 179 | 380 | 0 | 0 | 532 | **1,436** |
| NBS Phase 1 Transactions | 344 | 179 | 228 | 111 | 22 | 532 | **1,417** |
| NBS Phase 2 Transactions | 344 | 179 | 19 | 222 | 22 | 532 | **1,319** |
| BI3 Messages | 344 | 1,292 | 380 | 0 | 0 | 585 | **2,602** |
| NBS Phase 1 Messages | 344 | 1,292 | 228 | 777 | 198 | 585 | **3,425** |
| NBS Phase 2 Messages | 344 | 1,292 | 19 | 1,554 | 198 | 585 | **3,993** |

As can be seen, although the number of transactions being handled reduces by about 9% (from BI3 to NBS Phase 2), the number of messages being processed increases by 53%. This is because transactions are being switched from OBCS that has only a single message per transaction to NBS, which has 7.

There are a number of infrastructure components that support this message load in a common way (i.e. they don't differentiate between the transaction types). For these components (providing the assumptions above are not violated) the mix of business transactions can be changed and the ability of the components to handle the message workload is not altered.

If the number of concurrent Branch connections to the data centres remained constant, the infrastructures' utilisation would increase linearly as the message load increased. However as the Online Transaction workload increases, the number of concurrent Branch connections also has to increase. This reduces the ability of the infrastructure components to support the message load, as they also have to handle the concurrent connections.

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The table below summarises the ability of these components to handle the workload for the three scenarios. The impact of the Branch concurrency can be seen by the reduction in the capability of the components. The utilisation shown is the percentage of the maximum safe utilisation that is used (i.e. it is safe to have a 100% utilisation.

Note the numbers assume that the changes required to support Network Banking Phase 2 have not taken place - hence the utilisation on the Branch to Data Centre Network Bandwidth (the bandwidth usage between Energis and the Bootle and Wigan data centres). Once Post Office has requested that NBS Phase 2 is supported, this table will be updated.

| Component | BI3 | | NBS Phase 1 | | NBS Phase 2 | |
|---|---|---|---|---|---|---|
| | Capability (Msgs/s) | Utilisation | Capability (Msgs/s) | Utilisation | Capability (Msgs/s) | Utilisation |
| Correspondence Servers | 5,410 | 48% | 4,750 | 72% | 4,420 | 90% |
| VPN Servers | 12,429 | 21% | 7,485 | 46% | 4,780 | 84% |
| Branch to Data Centre Network Bandwidth | 7,728 | 34% | 3,976 | 86% | 1,461 | 273% |
| Data Centre LAN Segment Bandwidth | 13,202 | 20% | 12,043 | 28% | 11,352 | 35% |
| Data Centre LAN Switch Bandwidth | 189,053 | 1% | 187,405 | 2% | 186,485 | 2% |

## 4.3 Overnight Batch

The main capacity issue for the overnight batch processing is whether there is sufficient time to complete all of the batch jobs in the available time period. However this doesn't tell the whole story, as the resource usage during the operation needs to be considered - a low utilisation suggests that spare capacity should be available during part of the overnight run for new jobs.

The table below summarises the overnight operation for the three scenarios above. The NBS Phase 2 figures assume that the NBS Phase 2 host upgrade has not taken place. Once Post Office has requested that NBS Phase 2 is supported, this table will be updated.

| Area | BI3 | NBS Phase 1 | NBS Phase 2 |
|---|---|---|---|
| Overnight Duration (Hours) | 10.1 | 11.9 | 17.9 |
| Overnight Utilisation (Hours) | 89% | 93% | 86% |
| Overnight Completes | 116 min Early | 06 min Early | 355 min Late |

The ability to deliver files to TIP, OBCS and AP Clients in the early evening also has to be considered. This is covered in more detail in the model.

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## 4.4 Storage

There are a number of applications that require storage to hold their data and each application is given its own area of physical disk to hold this data. They may in reality be in a separate storage system from other applications (e.g. the support file server uses a separate storage system from Riposte or Audit) or be in a shared storage system used by several applications (e.g. The Host Databases, MIDTID and KMA all share a single EMC array). Even when a shared storage system is used, it is extremely difficult to move physical storage from one application to another.

Therefore practically, each application has to be given enough storage to support its full volumes, even if those volumes reduce over time, while another application's usage is rising. Also it is generally more cost effective to allocate the maximum storage required by an application from day 1, rather than adding storage as the application grows (the cost of change is often more than the cost of the storage).

Within an application, storage may be broken into multiple areas. For example TPS has separate areas for the database and file storage, with the database itself broken into indexes, permanent data and temporary data. The layout of the data itself is also generally optimised to the performance requirements of the application.

One final problem is that the average size of a data item (e.g. NBS transaction) is not well understood until an application has been live for some time. Even then, changes to customer behaviour (e.g. buying a different mixture of products) can cause changes to the average data size, without increasing the workload volumes.

For all these reasons, the storage areas are sized to support the full application requirements with sufficient contingency to allow for some unexpected growth in data or indexes sizes. It is therefore difficult at any point in time to state how much headroom there is in the sizing.

In summary therefore, the storage system is assumed to be 100% utilised. When Post Office wishes to increase volumes, the current storage of the applications will then be resized to see if the increase can be accommodated without having to purchase additional capacity.

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# 5.0 Volume Justification

This section provides background information to justify some of the volumes in the previous sections

***This section has no contractual significance.***

## 5.1 Online Transaction Rollout

The table below provides the estimated peak transactions per second rate for OBCS Foreigns, NBS and DC (see [AllocProcess]).

The following assumptions were made in calculating the values for OBCS Foreigns:

- OBCS Foreigns are 1.5% of all OBCS transactions.
- OBCS Transactions peak at 350 transactions per second.
- OBCS declines as NBS increases from April 2003.
- Once NBS is fully rolled out there are still 5% OBCS left.

| Month | % of Final Workload Active | | | Peak Transactions Per Second | | | |
|---|---|---|---|---|---|---|---|
| | OBCS | NBS | DCS | OBCS Foreigns | NBS | DC | Total |
| Jan-03 | 100.00% | 0.47% | 0.00% | 5.3 | 1 | 0 | 6 |
| Feb-03 | 100.00% | 0.93% | 0.00% | 5.3 | 2 | 0 | 7 |
| Mar-03 | 100.00% | 1.87% | 0.00% | 5.3 | 4 | 0 | 9 |
| Apr-03 | 96.45% | 3.74% | 4.55% | 5.1 | 8 | 1 | 14 |
| May-03 | 91.12% | 9.35% | 9.09% | 4.8 | 20 | 2 | 27 |
| Jun-03 | 86.24% | 14.49% | 13.64% | 4.5 | 31 | 3 | 39 |
| Jul-03 | 80.02% | 21.03% | 18.18% | 4.2 | 45 | 4 | 53 |
| Aug-03 | 70.26% | 31.31% | 22.73% | 3.7 | 67 | 5 | 76 |
| Sep-03 | 65.37% | 36.45% | 27.27% | 3.4 | 78 | 6 | 87 |
| Oct-03 | 57.83% | 44.39% | 31.82% | 3.0 | 95 | 7 | 105 |
| Nov-03 | 52.94% | 49.53% | 40.91% | 2.8 | 106 | 9 | 118 |
| Dec-03 | 48.50% | 54.21% | 50.00% | 2.5 | 116 | 11 | 130 |
| Jan-04 | 39.18% | 64.02% | 59.09% | 2.1 | 137 | 13 | 152 |
| Feb-04 | 35.19% | 68.22% | 63.64% | 1.8 | 146 | 14 | 162 |
| Mar-04 | 31.64% | 71.96% | 72.73% | 1.7 | 154 | 16 | 172 |
| Apr-04 | 27.64% | 76.17% | 77.27% | 1.5 | 163 | 17 | 182 |
| May-04 | 24.98% | 78.97% | 81.82% | 1.3 | 169 | 18 | 188 |
| Jun-04 | 21.43% | 82.71% | 86.36% | 1.1 | 177 | 19 | 197 |
| Jul-04 | 17.87% | 86.45% | 90.91% | 0.9 | 185 | 20 | 206 |
| Aug-04 | 16.10% | 88.32% | 90.91% | 0.8 | 189 | 20 | 210 |
| Sep-04 | 13.43% | 91.12% | 95.45% | 0.7 | 195 | 21 | 217 |
| Oct-04 | 9.88% | 94.86% | 95.45% | 0.5 | 203 | 21 | 225 |
| Nov-04 | 8.55% | 96.26% | 100.00% | 0.4 | 206 | 22 | 228 |
| Dec-04 | 6.78% | 98.13% | 100.00% | 0.4 | 210 | 22 | 232 |
| Jan-05 | 6.33% | 98.60% | 100.00% | 0.3 | 211 | 22 | 233 |
| Feb-05 | 5.00% | 100.00% | 100.00% | 0.3 | 214 | 22 | 236 |
| Mar-05 | 5.00% | 100.00% | 100.00% | 0.3 | 214 | 22 | 236 |