

**High Level Design Specification for Track and Trace (T&T) Agents****Company-in-Confidence****Ref: DE/HLD/015****Version: 4.0****Date: 27-Aug-2008**

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Abstract: This is the High Level Design for the Track and Trace (T&T) Agents that harvest the T&T messages recorded at the Horizon Counter to NPS and present these messages to the Enterprise Data Gateway (EDG) Web Service to be processed, receiving an acknowledgement in return. This internal Fujitsu Services document is intended to provide the level of detail to provide a baseline for the Post Office Account developers and testers.

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0.0 Document Control

0.1 Document History

Version No.	Date	Reason for Issue	Associated CP/PinICL
0.1	28/09/2004	First draft issued for review.	CP3770
0.2	02/11/2004	Revisions due to review comments and additional information.	
0.3	30/11/2004	Revisions incorporating changes resulting from the updated AIS and TIS and review comments.	
1.0	14/12/2004	Baseline for document including minor revisions due to review comments.	
1.1	17/01/2005	Revisions to the PAF address Riposte attributes for the delivery address for the Detailed record and the format of the event date in the Ad-Hoc record.	
1.2	31/01/2005	Revisions to provide clarification for the use of the PAF address Riposte attributes.	
1.3	09/02/2005	Revisions to include the Cluster id in the Monitor id for the Agents and also in the file names for the T&T EDG Interface Agent statistic files. Also the inclusion of the T&T event filtering information supplied by Simon Fawkes.	PC0115110
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2.1	31/10/2005	Added "Last Dispatch" flag (at BI3 S90). Clarified that FAD code is padded with leading zeroes (at BI3 S81R). Corrected "PAF Validated" flag to align with AIS (and the executable code).	CP4034 PC0125635 CP4066
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		Added "Guaranteed Date", "DD flag", "FAD".	CP4507
		Escape the 5 special characters '<>& quote and double quote'.	PC151919
		Use local time for H_DT and A_ET fields.	PC149242
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0.2 Review Details

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0.3 Associated Documents

Reference	Version	Date	Title	Source
[PA/TEM/001]	9.0	07/02/05	Fujitsu Services Document Template	PVCS
[AD/DES/039]			Generic Agent Components for Release CSR+ High Level Design	PVCS

[AD/DES/066]			Pathway Agents: XML-RAG Converter	PVCS
[AS/DPR/013]			Design Proposal for Track & Trace	PVCS
[AS/IFS/001]	4.0		Horizon to EDG Feed for Track and Trace	PVCS
[AS/IFS/002]	1.0	02/03/05	Horizon to EDG – Technical Interface Specification for Track and Trace	PVCS
[AD/LLD/005]			Low Level Design for NBX Guaranteed Reversals Agent	
[CR/CDE/018]	2.2	05/09/05	Track and Trace Integration – Conceptual Design	PVCS
[CR/CDE/019]	1.0	07/08/04	Requirements Catalogue for Track and Trace Integration	PVCS
[DE/HLD/014]			Track and Trace – Counter High Level Design	PVCS
[DE/LLD/015]			Low Level Design for Track and Trace EDG Interface Agent	PVCS
[DE/LLD/019]			Low Level Design for Track and Trace Harvester Agent	PVCS
[NB/DES/008]			Platform Physical Design for the NBX Routing Agent Server	PVCS
[NB/HLD/027]	1.0	25/11/04	NPS Track and Trace Changes HLD	PVCS
[PF/HLD/001]	1.0	14/05/04	High Level Design – Counter PAF Module	PVCS
[RD/DOC/003]			Smart Post Application Reference Data Definition	PVCS
[RS/DES/081]			Implementation Build Guide for Secure NT Platforms	PVCS
[RS/FSP/001]			Security Functional Specification	PVCS
[RS/POL/002]			Horizon Security Policy	PVCS
[SD/DES/262]			EDG (GP) FTMS Local Gateway Physical Platform Design	PVCS
[UM/LLD/005]			Smart Post Admin Track and Trace Low Level Design	PVCS
[WSIS]	0.1	03/12/04	Horizon EDG Web Service Interface Specification	Prism

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

0.4 Abbreviations/Definitions

0.4.1 Abbreviations

Abbreviation	Definition
ACRR	Agent and Correspondence Server – Resilience & Recovery.
AIS	Application Interface Specification.

ASCII	American Standard Code for Information Interchange.
CCS	Counter Call Scheduler.
CD	Conceptual Design.
CS	Correspondence Server.
DMZ	Demilitarised Zone. An area of the network protected by firewalls which separate it both from external systems and from the main Horizon data centres.
DP	Design Proposal.
EACRR	Enhanced Tivoli/ACRR.
EDG	Enterprise Data Gateway.
EE_IO	Enquiry Engine Input Output.
EPOSS	Electronic Point of Sale Service.
FS	Fujitsu Services.
HLD	High Level Design.
HTTP	Hypertext Transfer Protocol.
ITU	Integration and Testing Unit.
LDT	Last Despatch Time.
LLD	Low Level Design.
MS	Microsoft.
MSMQ	Microsoft Message Queuing.
NBE	Network Banking Engine.
NBX	Term used to describe the NBE functionality absorbed into the Horizon domain.
NPS	NBX Persistent Store.
OBC	Operational Business Change. A mechanism for POL to request day to day changes to data within the Horizon system.
PAF	Postal Address File.
PIT	Product Integration Team.
PO	Post Office.
POA	Post Office Account.
POL	Post Office Limited.
PPD	Platform Physical Design.
QAS	Quick Address Software.
RAG	Riposte Attribute Grammar.
RASD	Requirements, Architecture & Strategy Development.

Riposte	Retail Integrated Point Of Sale system in a Transaction Environment. Proprietary product from Escher group that is used to: (a) Support the Counter PC user's desktop. (b) Provide a speedy and reliable message replication process between the Counters in a Branch and the Correspondence Servers at the Campuses. The term includes WebRiposte whenever the context admits.
RPC	Remote Procedure Call
SI	Systems Integration.
SOAP	Simple Object Access Protocol.
T&T	Track and Trace.
TCP	Transmission Control Protocol.
TEC	Tivoli Event Console.
TIS	Technical Interface Specification.
WS	Web Service.
WSDL	Web Service Descriptor Language.
XML	Extensible Mark-up Language.

0.4.2 Definitions

The following terms, when Capitalised as here, have specific meanings as indicated:

Term	Definition
Agent	Component of the Horizon Application Architecture that conventionally sits between the Correspondence Servers and Host (or external) layers.
Agent Hash	The Agent Hash is a value between 0 and 3 algorithmically derived from the Branch's FAD Code at the Counter.
Agent Server	Hardware platform that supports Agent processes. It includes the Generic Agent Server, as well as application-specific servers such as the EDG (GP) FTMS Local Gateway Servers and NBX Routing Agent Servers.
Branch	PO location with one or more Counters installed as part of the Horizon programme.
Campus	One of two Horizon data centres in Bootle and Wigan. Each can handle the entire Horizon workload.
Cluster	Group of Correspondence Servers, all handling the same set of Branches and replicating data between each other for resilience purposes.
Cluster Lookup Service (LUC)	An NT service that supports Agents in a multiple Cluster environment. It provides a mapping of Riposte Groups to Clusters.
Correspondence Server	Hardware platform that supports the Campus-based Riposte Message Service, and handles message replication to and from a group of Branches.
Counter	Counter PC installed in a PO Branch.

Generic Agent Server	Hardware platform that supports the Agent processes for most applications (i.e. all those for which there are no application-specific requirements).
Horizon	Horizon is the end-to-end solution that provides Post Office with a range of Counter services.
Host Layer	Architectural layer containing the services running on the Host Central Servers.
Platform	An instance of a hardware unit (server, workstation, Router etc) that is installed by and configured by POA to meet the Horizon security, application and capacity requirements.
Prism	The alliance of companies responsible for supporting POL desktop and business systems.
Reference Data	<p>This is used in three different ways:</p> <p>The end to end service for the receipt, manipulation and delivery of configuration data and parameters for use by the rest of the system, within the Horizon Programme.</p> <p>Read Only Data defined in the Riposte Message Store providing sets of Collections and Objects used to configure the Branch and define the business parameters to be used and followed in providing a Counter service.</p> <p>The entirety of read only objects within the system, whether in the Riposte Message Store or not, that configures the system in some way or provides soft parameters to system definition and use.</p>
Release	A documented and co-ordinated collection of software and/or data provided by FS to deliver POL Services, or to extend the infrastructure used to deliver these services.
Token	Generic name for magnetic swipe cards, smart cards or bar codes used to initiate a Counter transaction.
Transaction	A recorded and auditable instance of business activity, involving service provision or Stock movement across organisational or service boundaries.
WebRiposte	A version of Riposte that supports additional web functionality. (This additional functionality is not relevant to the Agents described in this document).

0.5 Changes in this Version

Version	Changes
0.1	Initial version.
0.2	Changes due to review comments and additional information.
0.3	Revisions due to review comments and changes to the AIS and TIS.
1.0	Baseline for document including minor revisions due to review comments.
1.1	<p>Changes to include the Riposte attributes for PAF addresses for the delivery address in the Detailed record.</p> <p>Change to the formatting of the Event Date for the Ad-Hoc record from YYYYMMDD to YYMMDD.</p>

1.2	Changes to clarify the use of the PAF address Riposte attributes to form the delivery address sent to the EDG in the Detailed record.
1.3	Changes to include the Cluster id in both the monitor id for the Agents and in the file names for the T&T EDG Interface Agent statistic files. Also the inclusion of the T&T event filtering information supplied by Simon Fawkes.
1.4	Changing the heartbeat intervals to 5 minutes. Generate Windows events for monitoring exceptions raised on the T&T Exceptions Table. Minor changes due to review comments.
2.0	Issue for approval (at S80).
2.1	Added “Last Dispatch” flag (CP4034, at BI3 S90). Clarified that FAD code is padded with leading zeroes (CP4066, at BI3 S81R). Corrected “PAF Validated” flag to align with AIS (and the executable code). A (very) few minor changes elsewhere. This includes joining the two parts of Table 11 and moving the text that was formerly between the two parts.
2.2	Added “Country of Destination” in Delivery address line 4 (CP4107).
3.0	Issue for approval (at S90). Resource name changed from “DB” to “DB1” (Table 29) (PC0128464)
3.1	Added “Value of Goods”, “Consequential Loss Value”, “Item Format”. (CP4401) Added “Guaranteed Date”, “DD flag”, “FAD”. (CP4507) Escape the 5 special characters ‘<> & quote and double quote’. (PEAK 151919) Use local time for H_DT and A_ET fields. (PEAK 149242)

0.6 Changes Expected

Changes
None

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1.0 Introduction

This is an internal FS document providing the HLD specification for the new Agents produced for the T&T Integration development. There are two types of Agent specified within this document, one that harvests the T&T messages recorded at the Horizon Counter from the Correspondence Servers. This Agent converts the Riposte attributes of these messages into XML and writes them to a table on the NBX Persistent Store (NPS). The second Agent retrieves these messages from the NPS and validates and converts them into the format expected by the Enterprise Data Gateway Web Service (EDG WS). The XML document produced is sent as a SOAP request via an RPC over HTTP using TCP to the EDG WS which uses Microsoft Message Queue (MSMQ) at its back end to secure the call and pass the data on to the EDG engine. This Agent receives a synchronous acknowledgement from the EDG WS as a SOAP response confirming the message has been received.

These Agents are required for Release BI3 S80. CP4034 has produced a minor change for Release BI3 S90, CP4066 for BI3 S81R, and CP4107 for shortly after BI3 S90.

CP4401 and CP4507 introduce changes for smartpost and Kahala integration with smartpost for Release T82. The PEAK fix, reference PC151919, has been implemented at T84.

2.0 Scope

This document describes the High Level Design for the new Agents for T&T Integration. The level of detail is intended to act as a baseline to FS POA developers and testers.

The Conceptual Design (CD) for T&T Integration is described in [CR/CDE/018] and the system outline design is provided by the Design Proposal (DP) [AS/DPR/013]. The DP describes the architecture for T&T Integration and the following new agents are required to support this model:

Agent	Description
T&T Harvester Agent	This Agent harvests T&T messages from the Correspondence Servers, converts them to XML and writes them to NPS.
T&T EDG Interface Agent	This Agent retrieves the T&T messages from NPS, validates, formats and sends them to the EDG WS via SOAP over HTTP using TCP receiving a confirmation in return that they have been received.

Table 1 – T&T Integration Agents

The Horizon Counter facilities for T&T Integration are described in the HLD [DE/HLD/014] which defines the T&T message formats that are harvested by the T&T Harvester Agent from the Correspondence Servers.

The interface between the T&T EDG Interface Agent and the EDG WS is described in the Application Interface Specification (AIS) [AS/IFS/001] and the Technical Interface Specification (TIS) [AS/IFS/002]. The EDG WS is developed by the Prism Alliance and the platform(s) hosting the EDG WS and MSMQ will be developed and supported by Prism.

The tables required on NPS for the T&T data derived from the T&T messages are described in detail in the NPS T&T Changes HLD [NB/HLD/027]. However, the interaction between the T&T Integration Agents and these tables is described in this HLD.

3.0 Design Principles

So far as is practicable, all new Agents should be designed in line with the existing generic models, structures and standards for Harvester, Loader and Enquiry Agents. The design principle is that as much as is possible should be configurable and amendments to existing Agents should be applied in such a way that existing functionality is untouched as far as is practicable. This is to avoid introducing the new bugs that would be introduced were the Agent to be unnecessarily re-engineered.

The new T&T Harvester Agent should be modelled closely to the existing NBX Guaranteed Reversals Agent, for assured harvesting of [C0]s.

The design of these Agents takes into account as far as is possible the perceived future design for T&T for IT roadmap where Riposte will be superseded by a Transaction Store and Consolidation (TSC) table. The T&T Harvester Agent will no longer be required but the T&T EDG Interface Agent should be able to be switched to the new source for the T&T messages with as little change as possible.

3.1 Assumptions

The following assumptions have been made with this design document:

- The T&T messages are held in ASCII format on the Correspondence Servers and in the SOAP requests sent to the EDG WS so that no character set transformations are required.
- There are no priorities on the order in which different types of T&T messages are processed by the T&T Agents. This is done by the sequence in which they are harvested from the Correspondence Servers for each Cluster. This is a reasonable assumption in that the T&T messages are constantly harvested and sent to the EDG WS by the T&T Agents and T&T message priority would only be an issue in clearing a backlog of the messages due to an Agent/EDG WS failure or the rate at which T&T messages are recorded at the Counter exceeding the rate at which the EDG WS can process these messages.
- Any codes required for the EDG WS such as the file type identifying the client (i.e. "POLP" for Parcelforce or "POLR" for Royal Mail) do not require any mapping to be performed by the T&T Agents. These should be recorded at the Counter as they are expected by the EDG WS.
- The T&T information does not contain any sensitive data that requires encryption and/or access control.

4.0 Requirements

The requirements affecting T&T Agents are captured in the CD [CR/CDE/018] although this document is superseded by the Requirements Catalogue detailed in [CR/CDE/019].

The following tables are a synopsis of the requirements, and the reader should refer to the CD and the Requirements Catalogue for a full statement of these requirements. The tables include a brief statement of how the requirement is met.

4.1 Architectural Requirements

4.1.1 Constraints Framework & Building Blocks

Ref.	Synopsis of requirement	How met
T&T-001	Smart post should validate and capture postal addresses using the Generic Horizon PAF module.	This is covered in the Counter HLD [DE/HLD/014]. The validated address is written to the Transaction message harvested by the T&T Harvester Agent.
T&T-161	The T&T architecture should provide an interface building block that can bring on new clients without the development of bespoke individual interfaces.	The interface building block is described in the AIS [AS/IFS/001] identifying the record formats for the EDG WS.

Table 2 – Architectural Requirements – Constraints Framework & Building Blocks

4.1.2 Integration with Other Systems

Ref	Synopsis of requirement	How met
T&T-005	The T&T/PAF information supplied to EDG should conform to the agreed AIS/TIS ([AS/IFS/001]/[AS/IFS/002]).	The T&T messages held in XML on the T&T Transaction table are formatted by the T&T EDG Interface Agent to conform to that described in the AIS before they are sent to the EDG WS via the methods described in the AIS and TIS.
T&T-163	The physical interface provided from Horizon to EDG should be as specified in the TIS ([AS/IFS/002]).	This underpins the design approach adopted for this document.
T&T-024	Reference data changes to T&T barcode data should be delivered within the existing OBC arrangement for smart post “Extra Data” files.	This is covered in the Counter HLD [DE/HLD/014].
T&T-026	T&T/PAF data should be delivered to the Data Centres within the current architecture.	T&T transactions are written to the Riposte message store at the Counter which is replicated to the Data Centres.
T&T-501	The Client Take-on process for adding new clients should be documented.	This is outside the scope of this document.

Table 3 – Architectural Requirements – Integration with Other Systems

4.1.3 Design Principles

Ref.	Synopsis of requirement	How met
T&T-018	Invoking external applications (including PAF) should be data driven.	This is covered in the Counter HLD [DE/HLD/014].
T&T-036	The system should support soft launch capability for T&T piloting.	This is covered in the Counter HLD [DE/HLD/014].
T&T-185	Smart post Admin Functions menu hierarchies and selection options must optimise transaction flows and ensure overall transaction times are kept to a minimum.	This is covered in the Counter HLD [DE/HLD/014].

T&T-210	Failure to send T&T information to the EDG for mails transactions should not cause the transaction to be abandoned.	There is no interaction between the EDG WS and the Counter; messages are written to the Riposte message store by the Counter application without awaiting a response from EDG WS. T&T messages held on the T&T Transaction table are only flagged as actioned if they have been received or explicitly rejected by the EDG WS.
T&T-141	Manual input of T&T barcodes must be possible.	This is covered in the Counter HLD [DE/HLD/014].
T&T-142	Manual input of address and Postcode should be allowed if supported by business rules for the service in question.	This is covered in the Counter HLD [DE/HLD/014].
T&T-143	T&T/PAF data should be retained in the message store in the event of a communications failure and transferred to the data centre at the earliest opportunity.	This is a feature of the Riposte message server. Messages written whilst the communications are unavailable will be replicated at the next opportunity.
T&T-144	T&T/PAF transaction messages should be duplicated across the Branch Counter network as well as being transferred to the Correspondence Servers.	This is covered in the Counter HLD [DE/HLD/014].
T&T-145	The T&T/PAF collection sub system should be duplicated across both data centres to provide a resilient delivery mechanism.	This is a feature of the Riposte message server. All messages written at the Counter are replicated to Correspondence Servers within both data centres. The T&T Harvester Agents are also located at each of the data centres in Bootle and Wigan so that in the event of a failure of one data centre the harvesting of the T&T messages can resume at the other data centre.

Table 4 – Architectural Requirements – Design Principles

4.2 T&T Processing

4.2.1 T&T Token

Ref.	Synopsis of requirement	How met
T&T-006	The Counter should recognise the T&T barcodes defined in the approved Smart Post Reference Data Definition update for T&T [RD/DOC/003].	This is covered in the Counter HLD [DE/HLD/014].
T&T-502	Non-GB barcodes conforming to the T&T barcodes defined in the approved Smart Post Reference Data Definition update for T&T [RD/DOC/003] should be processed.	This is covered in the Counter HLD [DE/HLD/014].

Table 5 – T&T Processing Requirements – T&T Token

4.2.2 T&T Reference Data

Ref.	Synopsis of requirement	How met
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T&T-007	New barcodes conforming to the T&T barcodes defined in the approved Smart Post Reference Data Definition update for T&T [RD/DOC/003] may be added using reference data as part of the OBC process.	This is covered in the Counter HLD [DE/HLD/014].
T&T-040	The smart post variable that initiates the capture of T&T data should be configurable with smart post reference data and may be applied to any Primary and Secondary service.	This is covered in the Counter HLD [DE/HLD/014].

Table 6 – T&T Processing Requirements – T&T Reference Data

4.2.3 T&T Validation Process

Ref.	Synopsis of requirement	How met
T&T-080	Scanned and manually entered barcodes should be verified against the format and check digit rules as described in the Smart Post Application Reference Data Definition (RD/DOC/003 [3]) and a suitable error message displayed if verification fails, except that the country code should no longer be validated.	This is covered in the Counter HLD [DE/HLD/014].
T&T-081	Checks should be in place so that an error message should be displayed when duplicate barcode presentation events occur.	This is covered in the Counter HLD [DE/HLD/014].
T&T-503	Checks should be made so that barcodes that are not associated with the postage service currently being transacted are rejected and a suitable error message displayed.	This is covered in the Counter HLD [DE/HLD/014].
T&T-082	Manual input of the T&T barcode must be allowed and validated against the validation rules (See T&T-080)	This is covered in the Counter HLD [DE/HLD/014].

Table 7 – T&T Processing Requirements – T&T Validation Process

4.3 Mails Acceptance (additional requirements to the delivered service)

Ref.	Synopsis of requirement	How met
T&T-023	Where time of posting is after the Last Despatch Time (LDT), the system should prompt the Counter clerk to inform the customer appropriately. If the customer still wishes to post the item, and the item is using a priority service: The Guaranteed Delivery Date (GDD) input should be adjusted accordingly (this is a manual process performed by the Counter staff). Mail Item Receipt / Certificate of Posting should include the GDD A message to state that the item has missed the LDT should be included on the mails receipt / COP	This is covered in the Counter HLD [DE/HLD/014].

Table 8 – Mails Acceptance Requirements**4.3.1 T&T Token**

Ref.	Synopsis of requirement	How met
T&T-006	The Counter should recognise the T&T barcodes defined in the approved Smart Post Reference Data Definition update for T&T [RD/DOC/003].	This is covered in the Counter HLD [DE/HLD/014].

Table 9 – Mails Acceptance Requirements – T&T Token**5.0 System Components****5.1 Application Components for T&T Agents****5.1.1 Introduction****5.1.1.1 T&T Integration Overview**

An overview of the architecture of the Horizon to EDG interface for T&T is given in the diagram below, taken from the DP for T&T Integration [AS/DPR/013] (the diagram in [AS/DPR/013] should be taken as the definitive source for this diagram):

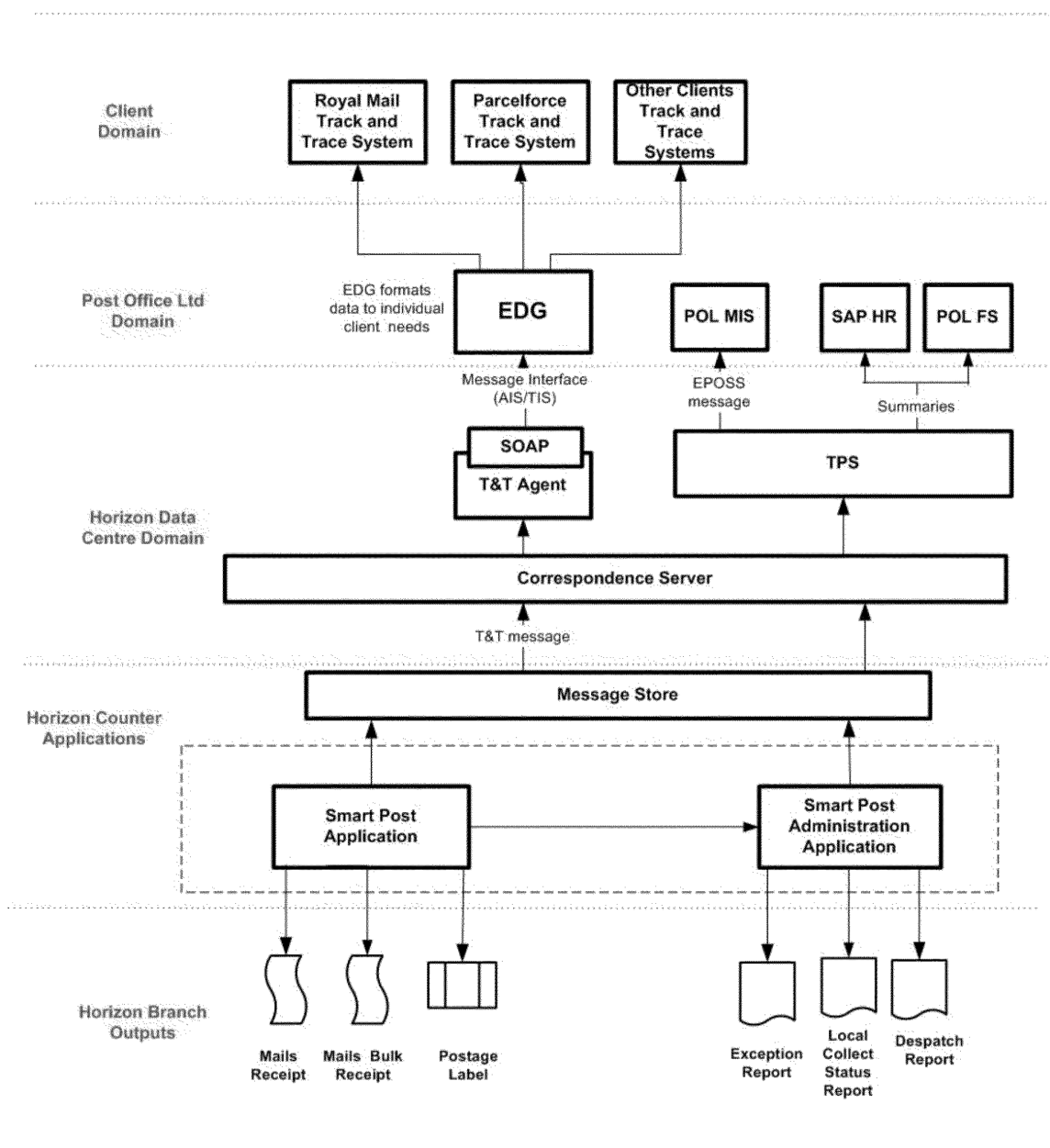


Figure 1 – T&T Data Flows and Architecture

5.1.1.2 NBX Persistent Store (NPS)

The T&T Integration Agents use the persistent storage mechanism called the NBX Persistent Store (NPS). The NPS includes the following for the T&T Integration:

- A transient table of T&T messages harvested by the T&T Harvester Agent. This table is then used by the T&T EDG Interface Agent to send the T&T messages to the EDG WS.

- An exceptions table holding details of any T&T messages that have been rejected by the EDG WS through the T&T EDG Interface Agent or that have failed to be harvested by the T&T Harvester Agent.
- Housekeeping to purge the T&T message records from the transient table holding these messages, when they have been processed, after a specified period of time.

5.1.1.3 Reference Data

The reference data described within the Counter HLD [DE/HLD/014] has no implications with respect to the Agents described in this HLD. However, T&T messages are to be treated at the Counter as 'urgent' which entails the configuration of the Counter Call Scheduler (CCS) through type D reference data to ensure this is the case.

5.1.1.4 Topology of the T&T Integration Agents

The key transaction flows with respect to the T&T Agents are defined by the following diagram. This concentrates on the flows from the Correspondence Servers through the T&T Harvester Agents to the NPS and then on to the EDG WS through the T&T EDG Interface Agent.

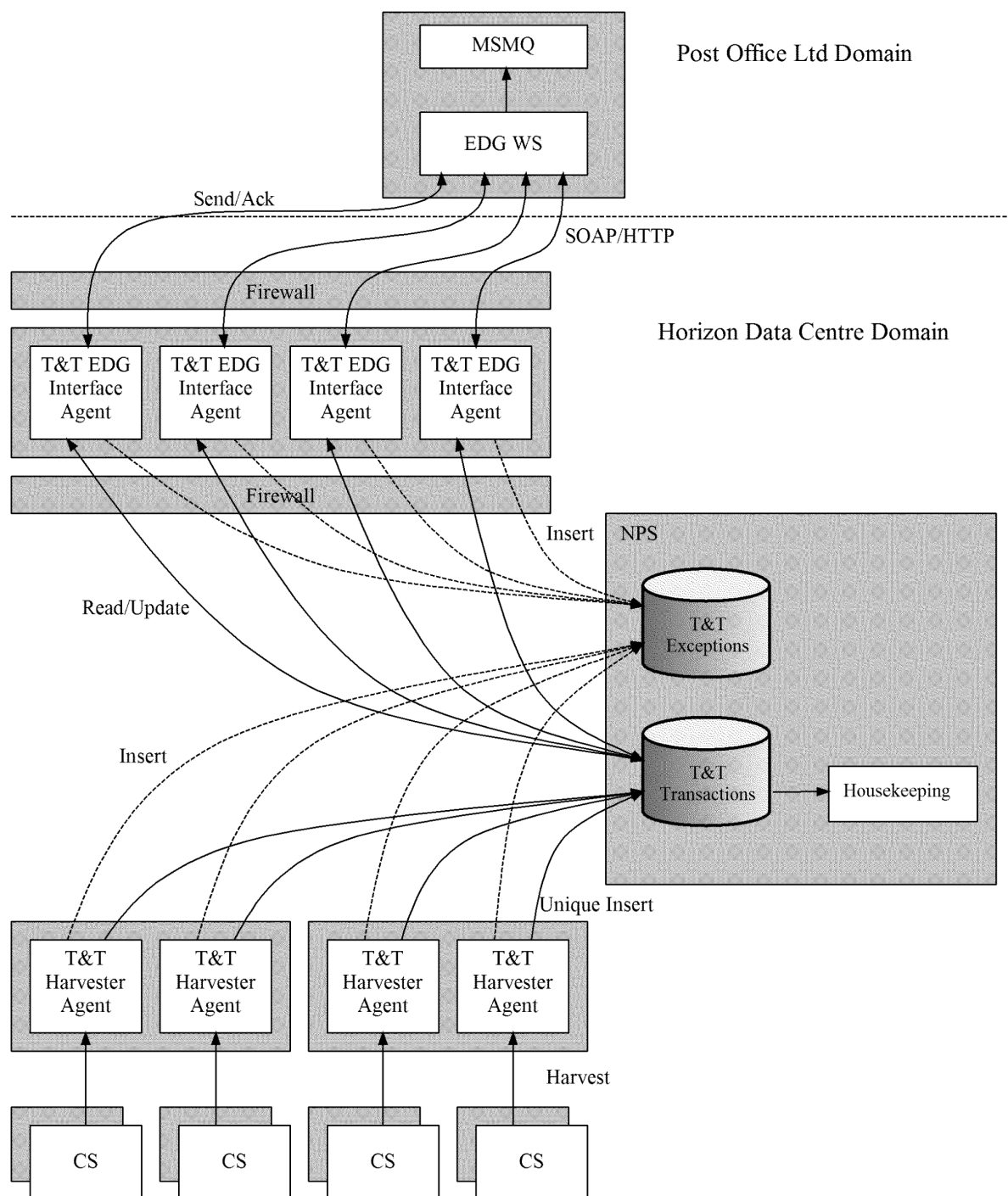


Figure 2 – Data Flows Involving T&T Agents

5.1.2 T&T Harvester Agent (TT_HV_ALL)

5.1.2.1 Overview

The T&T Harvester Agent harvests the T&T messages recorded at the Counter so that they can be presented to the EDG WS via the T&T EDG Interface Agent. These messages are retrieved from the Correspondence Servers using a checkpointed message port ensuring that every message is harvested, in the same way as the NBX Guaranteed Reversals Agent. The Riposte attributes of the T&T message identified by an inclusion list held in the Registry are converted into XML which is then written to the T&T Transaction table. The T&T messages held on this table in XML are then retrieved by the T&T EDG Interface Agent validated, formatted and sent to the EDG WS.

The one difference in the way that the T&T Harvester Agent works compared to the NBX Guaranteed Reversals Agent is that T&T messages are uniquely inserted into the T&T Transaction table using a unique Transaction Id. This is enforced by using a unique index on the Transaction Id field in the table so that no T&T messages are duplicated on the table.

5.1.2.2 Structure, Launch and Concurrency

The T&T Harvester Agent is a database-coordinated Interactive Harvester. There is one Agent instance per Riposte Cluster running on the NBX Routing Agent Server Platform (see the PPD [NB/DES/008]). This means there are four T&T Harvester Agents with the Service Name TMSTTHarvester<n>, where <n> identifies the Cluster Id.

The Agent runs as an NT Service, and is launched and relaunched by Tivoli, running under its own Service User name (see Table 33). The Agent is not dependent on any Correspondence Server in a different Cluster, nor will it be dependent on the Cluster Lookup Service.

The Agent uses a checkpointed message port with the checkpointing controlled by the PULSE_INTERVAL parameter. This should be configured so that following a failure any outstanding work can be caught up within five minutes of the Agent restarting. Checkpoints are divorced from commits to the database, which is controlled by the SUCCESS_UNIT_COUNT parameter. The proposed values are:

PULSE_INTERVAL: 960,000

SUCCESS_UNIT_COUNT: 50

The PULSE_INTERVAL used by the Agent needs to be different from those used by other Agents, so that they don't synchronise their checkpointing.

Restarting from a checkpoint necessarily means that T&T messages can be passed to the T&T Transaction table more than once. The use of a unique Transaction Id as a key on this table ensures that no duplicate records are written to the table should this occur. The duplicate T&T messages that the Agent attempts to write to the T&T Transaction table are ignored and are not treated as exceptions.

5.1.2.3 Detailed Processing

The T&T messages recorded at the Counter are identified by the <TTA:> Riposte attribute. Although other values may exist for this attribute the T&T messages held on the Correspondence Servers to be harvested by the T&T Harvester Agent are identified by this attribute having a value of 1 (see [DE/HLD/014]):

<Data:

<TandT:
<MData:
<TTA:1>

The following information is harvested from the T&T messages on the Correspondence Servers and written to the T&T Transaction table (see Section 5.3.2.2):

- The Cluster Id written to the CLUSTER_ID field on the T&T Transaction table is retrieved from the Registry where the Cluster the T&T Harvester Agent is servicing is defined (see Table 10).
- The unique Transaction Id written to the TRANSACTION_ID field on the T&T Transaction table is the EPOSS Transaction Id for messages containing an EPOSS Transaction. If the EPOSS Transaction does not exist for the T&T message a replacement unique id is recorded by the Counter and held in body of the T&T message. The Transaction Id is held in the Riposte attribute <TxnId:> either in the transaction data for EPOSS Transactions:

<TxnData:
<TxnId:44-901777-1-61439-3>

Or in the T&T information where an EPOSS Transaction Id does not exist:

<Data:
<TandT:
<Control:
<TxnId:44-fffff-c-nnnnnnnn-p>

- The Riposte attributes of the T&T message required by the EDG WS are identified in an inclusion list held in the Registry (see Table 11). These attributes are filtered from the T&T message held on the Correspondence Server and converted to XML using the XML-RAG Converter routines described in [AD/DES/066]. The XML produced only contains XML in the format supported by the XML-RAG Converter, which is a subset of the full XML specification (the restrictions are detailed in [AD/DES/066]). This XML is then written to the TT_MESSAGE field on the T&T Transaction table.

The T&T Harvester Agent does no validation of the T&T information in terms of the fields required by the EDG WS. This excludes checking to ensure that mandatory fields are present or any checking of the data in the Riposte attributes.

The T&T messages held on the T&T Transaction table can then be retrieved by the T&T EDG Interface Agent validated, formatted and sent to the EDG WS.

The T&T Counter HLD [DE/HLD/014] and LLD [UM/LLD/005] describe the T&T message format including the Riposte attributes for these messages and the design for the T&T Transaction table is described in detail in the NPS T&T Changes HLD [NB/HLD/027].

5.1.2.4 Exception Handling

The Agent will treat operational failures in the same manner as do other Harvester Agents with all failures recorded in the NT event log.

Exceptions that occur due to the Agent attempting to write duplicate T&T messages to the T&T Transaction table can be ignored and do not need to be recorded as exceptions on the T&T Exceptions table. In this case the T&T message for the Transaction Id in question must

already exist on the T&T Transaction table and this should only occur when the T&T Harvester Agent has failed and is restarted from a previous checkpoint.

T&T messages that can not be harvested are written to the T&T Exceptions table on NPS, and reported in the NT event log. A limit to the maximum number of these events (i.e. 50) that can be recorded along with a time limit after which the count is reset if the event hasn't occurred within this period (i.e. 1 hour), as applied to other Agents (i.e. the NBX Guaranteed Reversals Agent see [AD/LLD/005]), prevents an event storm in the event of a large number of exceptions. However, these exceptions should only occur due to:

- A missing Transaction Id from the T&T message on the Correspondence Server.
- Errors returned from the XML-RAG Converter routines used to convert the Riposte attributes of the T&T messages on the Correspondence Servers into XML before this is written to the T&T Transaction table.

Exceptions occurring in the T&T Harvester Agent will not have a Sequence Number (SEQ_NUMBER) to write to the T&T Exceptions table. This can be used to differentiate between exceptions occurring within the T&T Harvester Agent from the T&T EDG Interface Agent.

5.1.2.5 Performance and Scalability

The volumes for the T&T Integration are detailed in the CD [CR/CDE/018] with an expected peak of 12 Transactions per second. To cater for this level of activity four T&T Harvester Agents, one per Cluster, are deemed to be sufficient and Agent hashing is not therefore required for these Agents.

A failure could result in a T&T Harvester Agent instance having to reprocess all the T&T messages since a previous checkpoint. Using a Transaction Id as a unique key for the T&T messages ensures that duplicates can not be written to the T&T Transaction table in this case.

It is important that the NBX Routing Agent instance(s) on the same platform is not starved of processor resource. Therefore, it is proposed that these Agents will be bound to one of the two processors on the platform. This restricts the maximum usage by this Agent to 50% of the platform processor resource. This is done by the Agent using a "SetProcessAffinityMask()" call to bind it to the first processor, i.e. the one defined by the 2**0 bit in the affinity mask. Note the processor to which it binds is not currently configurable.

5.1.2.6 Resilience

The Enhanced Tivoli/Agent and Correspondence Server – Resilience & Recovery (EACRR) mechanism ensures that if an instance of the T&T Harvester Agent fails another one takes its place. When the Agent loses a connection with Riposte or the Oracle NPS database it fails and a new instance tries to re-establish the connections. The aim of EACRR is to restart a failed Agent instance within 5 minutes or so; the Agent instance then has to repeat work from the previous checkpoint in order to catch up.

Following a failure during the connection phase, the standard Agent approach of retries is appropriate; retries continue until the configured TOTAL_CONNECTION_TIMEOUT period has elapsed, after which the Agent fails. A timeout of the order of 5 minutes is required so that EACRR can restart it on another NBX Routing Agent Server well within the 15 minute period.

5.1.2.7 Security

There are no security issues with the T&T Harvester Agent as this Agent operates entirely within the Horizon domain.

5.1.2.8 Configurability

The following table, though not exhaustive (see [DE/LLD/019]), lists the main items for the T&T Harvester Agent that are configurable through the Registry:

Item	Description
Cluster Id	The CLUSTERID value holds the number of the Riposte Cluster for this Agent instance.
Pulse Interval	The PULSE_INTERVAL value controls the checkpointing for the Agent by defining the interval in terms of the number of messages processed by Riposte before a checkpoint is written (set to 960,000 (see Section 5.1.2.2)).
Success Unit Count	The SUCCESS_UNIT_COUNT value controls commits to the database by defining the number of messages before a commit is performed (set to 50 (see Section 5.1.2.2)).
Database Location	The DBLOCATION value identifies the location of the NPS database.
Oracle User Name	The USERNAME value identifies the Oracle user name to connect to the NPS database (see [NB/HLD/027])
Oracle Password	The PASSWORD value identifies the Oracle password for the user name that allows a connection to the NPS database.
Total Connection Timeout	The TOTAL_CONNECTION_TIMEOUT value applies to the period after which the Agent exits when attempting to connect to the Correspondence Server and the NPS database (5 minutes).
Heartbeat Interval	This is the interval between heartbeat MONID events being generated confirming that the Agent is available (5 minutes).
Inclusion List	The STANDARD_ATTRIBUTES list is a comma-separated list of the Riposte attributes held in the T&T messages that are required by the EDG WS. These attributes are converted to XML by the T&T Harvester Agent and held in the T&T Transaction table on NPS.

Table 10 – Registry for T&T Harvester Agent

The inclusion list described in the previous table includes the following Riposte attributes required for the message formats described in the AIS [AS/IFS/001] that need to be harvested by the T&T Harvester Agent to be sent to the EDG WS. Riposte attributes *italicised* in Table 11 may or may not exist within the T&T message, whereas the non-italicised attributes are always present.

Certain attributes may be repeated for multiple T&T items within the same T&T message. Multiple T&T items in the T&T message are grouped using the <MItem:> Riposte attribute, although this attribute may or may not exist for T&T messages containing single items. The <MItem:> Riposte attribute is not explicitly declared in the inclusion list for the T&T Harvester Agent; however, the Riposte attribute hierarchy is retained as XML tags within the

XML produced from the RAG-XML conversion ensuring that individual items are still segregated.

Riposte Attribute	Riposte Attribute Hierarchy	Description
<FT:>	<Data: <TandT: <MData: <FT:POLP>	The file type for the T&T transaction (i.e. "POLP" for Parcelforce or "POLR" for Royal Mail).
<Date:>	<Date:DD-MMM-YYYY>	The date the T&T transaction was recorded at the Counter.
<Time:>	<Time:HH:MM:SS>	The time the T&T transaction was recorded at the Counter.
<Add1:>	<Data: <TandT: <Control: <Source: <Add1:...>	The first line of the PO address where the T&T transaction is recorded.
<Postcode:>	<Data: <TandT: <Control: <Source: <Postcode:...>	The postcode of the PO address where the T&T transaction is recorded.
<Type:>	<Data: <TandT: <MData: <Type:D>	The record type for the T&T records sent to the EDG WS (i.e. "A" for Ad Hoc Event and "D" for Detailed).
<EV:>	<Data: <TandT: <MData: <EV:...>	The comma separated list of event codes to put in Ad Hoc Event records. One Ad Hoc entry to be generated per value and barcode.
<Name:>	<Data: <TandT: <Control: <Source: <Name:...>	The name of the PO Branch.

<VBC:>	<Data: <MItem: <VBC:...>	The barcode for the T&T item.
<VServ:>	<Data: <MItem: <VServ:...>	The EDG variant id for the primary service for Detailed records sent to the EDG WS.
<VWkend:>	<Data: <MItem: <VWkend:...>	The weekend handling code corresponding to the secondary service for Detailed records sent to the EDG WS.

<GroupId:>	<GroupId:...>	A six-digit FAD code identifying the collection point.
<Weight:>	<Data: <MItem: <Weight:...>	The weight of the T&T item in kg to 3 decimal places.
<Address:>	<Data: <MItem: <VDestina: <Address:...>	This contains the PAF Riposte attributes that provide details for the delivery address (see below).
<VLDT:>	<Data: <MItem: <VLDT:...>	This contains the Last Despatch flag (aka the Posted After Last Collection flag), set to “Y” if the T&T item was posted after the last collection, else set to “N” or omitted.
<Country:>	<Data: <Country:...>	The full name of the destination country. ¹
<VTTVOG:>	<Data: <MItem: <VTTVOG:...>	The value of goods in pence.
<VTTVOC:>	<Data: <MItem: <VTTVOC:...>	The value of ‘Consequential Loss’ in pence.
<VPiP:>	<Data: <MItem: <VPiP:...>	Item format, may be omitted.
<VGuarant0:>	<Data: <MItem: <VGuarant0:...>	Guaranteed Date in form DD/MM/CCYY, may be omitted.
<VGIND:>	<Data: <MItem: <VGIND:...>	DD flag. Set to ‘N’ if Guaranteed Date field is present and has been keyed by Clerk, set to ‘Y’ if Guaranteed Date field is present and has not been keyed by Clerk or set to ‘ ’ (space) if Guaranteed Date field is not present.

Table 11 – Inclusion List of Riposte Attributes Harvested by the T&T Harvester Agent

All the Riposte attributes generated through PAF (see [PF/HLD/001]) for the delivery address found under the <Data:<MItem:<VDestina:<Address:> attribute described in Table 11 are included in the XML produced from the RAG-XML conversion by the T&T Harvester Agent. The following tables only describe the delivery address attributes relevant to T&T, although other attributes will exist in the XML produced (e.g. Town/City, County/Region, and Country etc.).

Riposte attributes italicised in the following tables may or may not exist under the <Data:<MItem:<VDestina:<Address:> attribute, whereas the non-italicised attributes are

¹ In practice the <Country:> attribute will be present if (and only if) the T&T message results in a single Detailed record.

present. This assumes that the <Data:<MItem:<VDestina:<Address:> attribute does exist for the T&T message.

Riposte Attribute	Riposte Attribute Hierarchy	Description
<Result:>	<Data: <MItem: <VDestina: <Address: <Result:...>	The code identifying whether the address has been manually input or validated using the PAF WS. A code of "00" or "01" indicates that the address is PAF validated.

The following Riposte attributes can only exist for a PAF validated address under the <Data:<MItem:<VDestina:<Address:> attribute:

Riposte Attribute	Riposte Attribute Hierarchy	Description
<Org:>	<Data: <MItem: <VDestina: <Address: <Org:...>	The organisation name from the QAS address element of a PAF validated address (i.e. Fujitsu).
<POBox:>	<Data: <MItem: <VDestina: <Address: <POBox:...>	The PO box from the QAS address element of a PAF validated address (i.e. PO Box 1).
<Subprem:>	<Data: <MItem: <VDestina: <Address: <Subprem:...>	The sub premise name/number from the QAS address element of a PAF validated address (i.e. Flat B).
<Buildname:>	<Data: <MItem: <VDestina: <Address: <Buildname:...>	The premise name from the QAS address element from a PAF validated address (i.e. Ocean Towers).
<Buildnum:>	<Data: <MItem: <VDestina: <Address: <Buildnum:...>	The building number from the QAS address element of a PAF validated address (i.e. 27).
<Thoro:>	<Data: <MItem: <VDestina: <Address: <Thoro:...>	The thoroughfare from the QAS address element of a PAF validated address (i.e. Peak Lane).
<Postcode:>	<Data: <MItem: <VDestina: <Address: <Postcode:...>	The postcode from the QAS address element of a PAF validated address.

The following Riposte attributes can only exist for a manually entered PAF address under the <Data:<MItem:<VDestina:<Address:> attribute:

Riposte Attribute	Riposte Attribute Hierarchy	Description
<Premises:>	<Data: <MItem: <VDestina: <Address: <Premises:...>	The manually entered premises address element.
<Address:>	<Data: <MItem: <VDestina: <Address: <Address:...>	The manually entered address element.
<PostcodeZip:>	<Data: <MItem: <VDestina: <Address: <PostcodeZip:...>	The manually entered postcode address element.

Table 12 – PAF Generated Riposte Attributes for the Delivery Address

5.1.2.9 Audit

There is no requirement to audit the T&T Harvester Agent.

5.1.2.10 Operational Summary

Agent name: TT_HV_ALL	Platform(s): NBX Routing Agent Server
Service Name: TMSTTHarvester<n>	Style: Database-Coordinated Interactive Harvester
Scope & parallelism: One per Cluster where <n> identifies the Cluster Id.	
Registry key(s): HKEY_LOCAL_MACHINE\SOFTWARE\ICL\PathwayAgents\TT_HV_ALL HKEY_LOCAL_MACHINE\SOFTWARE\ICL\PathwayAgents\TT_HV_ALL\TMSTTHarvester<n>	
Use of checkpoints: Starts from named checkpoint, error if it does not exist.	
Checkpoint name(s): AGT_TT_HV_ALL_H_<n>_<suffix>	
Use of dummy offices: The Agent Data Office (999993) for holding management information on the history of backup checkpoints.	
Host database: NPS	
Needs to be running: Runs 7 x 24. Important between 07:00 and 20:00 7 days per week; Critical between 08:00 and 17:30 Monday to Friday and 08:00 and 13:00 Saturday.	
Documentation: [DE/LLD/019]	

Table 13 – Operational Summary of the T&T Harvester Agent

5.1.3 T&T EDG Interface Agent (TT_NQ_EDG)

5.1.3.1 Overview

The T&T EDG Interface Agent retrieves the harvested T&T messages held in XML on the T&T Transaction table on NPS and validates and formats this information for the EDG WS as specified in the AIS [AS/IFS/001]. The XML document produced from formatting the Riposte attribute based XML for the T&T messages held on the T&T Transaction table are sent as a parameter in a SOAP request over HTTP using TCP to the EDG WS. The response received from the EDG WS identifies whether the message has successfully been received and if so the T&T Transaction table is then updated to confirm that the T&T message has been actioned and an update timestamp is written to the table. If there are no T&T messages to send or the EDG WS is unavailable the Agent sends Echo Test SOAP requests to the EDG WS to ascertain the state of the service. These message exchange patterns are described in the TIS [AS/IFS/002].

5.1.3.2 Structure, Launch and Concurrency

The T&T EDG Interface Agent is an Interactive Enquiry Agent with one Agent instance per Riposte Cluster identified by the Cluster Id field (CLUSTER_ID) on the T&T Transaction table. This means there will be four T&T EDG Interface Agents with the Service Name TMSTTEDGInf<n>, where <n> identifies the Cluster Id.

This Agent runs as an NT Service on the existing EDG (GP) FTMS Local Gateway Platform (see the PPD [SD/DES/262]) within a Demilitarised Zone (DMZ), and is launched and relaunched by Tivoli, running under its own Service User Name (see Table 33).

The T&T EDG Interface Agent works by having a single Control thread reading the T&T Transaction table. The Control Thread maintains a queue of T&T messages which are retrieved and processed by a configurable number of synchronous EE_IO threads that validate, format and send the information as a SOAP request to the EDG WS. Echo Test SOAP requests are sent at a regular configurable interval to the EDG WS to ascertain the state of the service if the Agent is idle (i.e. there are no T&T messages to send and the Agent has sent no T&T messages for a configurable period of time) or if the EDG WS is unavailable (i.e. T&T messages sent to the EDG WS failing for the configurable number of retries either through timeouts or receiving responses from the EDG WS signifying the service is unavailable).

5.1.3.3 Detailed Processing

The T&T EDG Interface Agent consists of the following three types of threads:

- A single Control thread organises the processing of the T&T messages held on the T&T Transaction table. This thread reads the table maintaining a queue of the T&T messages that haven't been processed for the Riposte Cluster Id identified in the Registry for the Agent (see Table 19).
- The messages are retrieved from this queue by the EE_IO threads which process them. If successful the EE_IO thread notifies the Control thread which updates the T&T Transaction table accordingly.
- A configurable number of synchronous EE_IO threads retrieve the T&T messages from the queue maintained by the Control thread. Each message once retrieved is

validated and formatted to create an XML document as defined in the XML schema in the AIS [AS/IFS/001]. This XML document is sent to the EDG WS as an input parameter in a SOAP request via RPC over HTTP and the Control thread is notified with the result of the request.

- A single Ping thread polls the EDG WS by issuing an Echo Test SOAP request and receives a response in return signifying the status of the EDG WS. These requests are initiated if the Agent is idle for a configurable period of time (i.e. there are no T&T messages to send) or if the EDG WS is unavailable.

Detailed descriptions of the Control, EE_IO and Ping threads are provided in the following sections but an overview of this process for the T&T EDG Interface Agent is shown in the following figure:

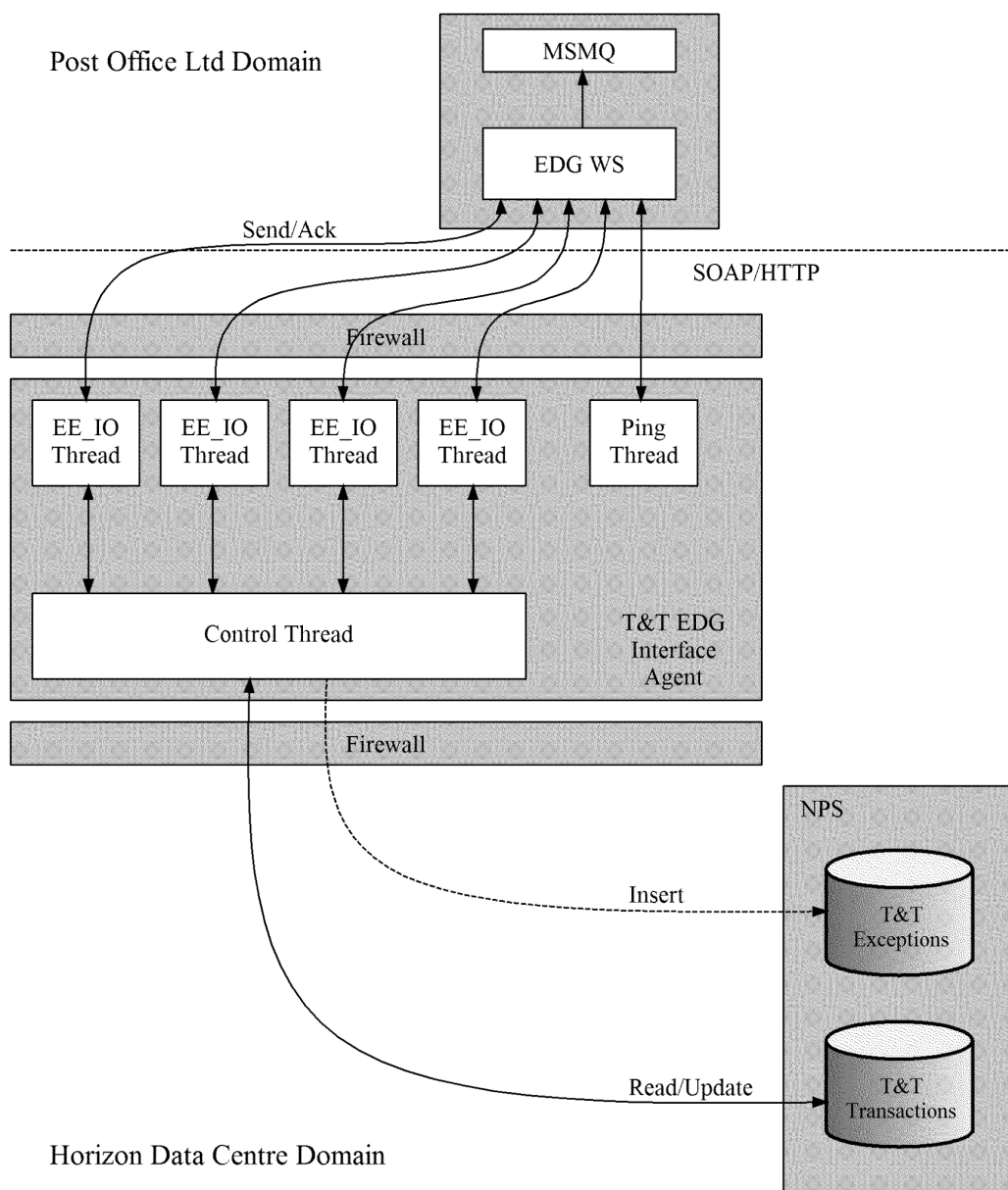


Figure 3 – T&T EDG Interface Agent Threading Model and Data Flows**5.1.3.3.1 Control Thread**

The T&T EDG Interface Agent contains a single Control thread that reads the T&T Transaction table on NPS returning records in Sequence Number (SEQ_NUMBER) order that have not been processed (ACTIONED is “N”) for the Cluster Id (CLUSTER_ID) the Agent is servicing. The Control thread maintains a queue of the T&T messages that are processed by the EE_IO threads as they become available. A high water mark value, initially set to 0, is set to the last Sequence Number in the queue to ensure that records on the T&T Transaction table are only read once. The size of the queue is managed by configurable high and low threshold values held in the registry (see Table 20). The T&T Transaction table is read until the queue

reaches the high threshold where further reads are suspended until the queue reaches the low threshold when the reading of the table is resumed.

When a T&T document SOAP request sent to the EDG WS by an EE_IO thread is successful or explicitly rejected by the EDG WS, identified by the “<faultcode>” element of the “<soap:Fault>” in the response having the value “soap:client”, the Control thread updates the actioned flag (ACTIONED=”Y”) and the updated timestamp (UPDATE_TSMP is set to the current date and time) on the T&T Transaction table for the T&T message record in question. When T&T messages are rejected by the EDG WS (“<soap:Fault>” has a “<faultcode>” of “soap:client”) the corresponding record from the T&T Transaction table is written to the T&T Exceptions table along with the description of the fault held in the “<faultstring>” element of the “<soap:Fault>” in the response, which is written to the EXCEPTION_DETAILS field.

5.1.3.3.2 EE_IO Thread

The EE_IO thread retrieves messages held in the T&T message queue maintained by the Control thread. This message is validated and formatted to produce the XML document that is passed as a parameter in the SOAP request sent to the EDG WS. The format of the T&T XML document sent to the EDG WS is described in the XML schema in the AIS [AS/IFS/001] and consists of the following:

- The Version Number for the interface (XML tag <VER>).
- The Transaction Id for the T&T message (XML tag <TXNID>).
- A Header record (XML tag <TNTHEAD>).
- A Sender record (XML tag <TNTSEND>).
- Either Detailed (XML tag <TNTDET>) or Ad Hoc Event (XML tag <TNTADHOC>) records. The type of these records being identified by the <Type:> Riposte attribute that is set to either “D” for Detailed or “A” for Ad Hoc Event. Only one type or the other can be sent to the EDG WS in the XML document.
- A Trailer record (XML tag <TNTTRAIL>).

The Version Number for the interface is set to 1.1 (see the AIS [AS/IFS/001]).

The Transaction Id is obtained from the TRANSACTION_ID field on the T&T Transaction table for the T&T message. The EDG WS checks the SOAP wrapper before sending a SOAP response to the Agent but doesn't check the body of the XML document. The Transaction Id provides a means of tracing the T&T message at the EDG WS back to the Horizon domain if there are any issues with the subsequent processing of a SOAP request once it has been received and accepted by the EDG WS.

The data for the individual fields within the T&T message records (Header, Sender, Detailed, Ad-Hoc Event and Trailer) sent to the EDG WS are held in the Riposte attribute based XML in the TT_MESSAGE field on the T&T Transaction table. The mapping of the Riposte attributes to the XML tags for the fields in the above records for the EDG WS are described in the following tables. These tables identify the fields as defined within the AIS [AS/IFS/001] and the Riposte attribute that maps to them along with any details about the formatting or validation of the data. Only the fields included in the XML document sent to the EDG WS are listed.

Field No.	Field Name	Opt/Mand	Riposte Attribute	XML Tag	Description
1	Record type indicator	M	N/A	H_RTI	Set to "0".
3	File type	M	<FT:>	H_FT	"POLP" for Parcelforce or "POLR" for Royal Mail.
7	Despatch date	M	<Date:>	H_DD	The date transacted at the Counter is held in the format "DD-MMM-YYYY" in the Riposte attribute but is converted to the format "YYYYMMDD" for the EDG WS.
8	Despatch time	M	<Time:>	H_DT	The time transacted at the Counter is held in the format "HH:MM:SS" in the Riposte attribute but is converted to the format "HHMMSS" for the EDG WS. GMT is converted to local time for the EDG WS.

Table 14 – Riposte Attribute Mapping to EDG WS Header Record Fields

Field No.	Field Name	Opt/Mand	Riposte Attribute	XML Tag	Description
1	Record type indicator	M	N/A	S_RTI	Set to "1".
3	Sender's name	M	N/A	S_SN	Set to "Post Office Ltd".
4	Sender's address 1	M	<Add1:>	S_SA1	The first address line of the PO Branch where the T&T transaction was recorded.
10	Sender's postcode	M	<Postcode:>	S_SPC	The postcode of the PO Branch where the T&T transaction was recorded.

Table 15 – Riposte Attribute Mapping to EDG WS Sender Record Fields

The type of records that form the body of the T&T message sent to EDG WS are defined by the Riposte attribute <Type:> which is set to <Type:D> for Detailed records and <Type:A> for Ad Hoc Event records. Where multiple Detailed or Ad Hoc Event records occur within the same T&T message the Riposte attributes specific to the individual records are encapsulated within the <Mitem:> Riposte attribute. The maximum number of Detailed or Ad Hoc Event records allowed for the XML document sent to the EDG WS is configurable (see Table 21) but is defined within the AIS [AS/IFS/001].

Field No.	Field Name	Opt/Mand	Riposte Attribute	XML Tag	Description
1	Record type indicator	M	N/A	D_RTI	Set to "2".
3	T&T number	M	<VBC:>	D_TT	The barcode for the T&T item.
4	Service Id	O	<Vserv:>	D_SID	The primary service id.

5	Weekend handling code	O	<Vwkend:>	D_WHC	The weekend handling code corresponding to the secondary service.
6	Postcode keyed	O	<Result:>	D_PAF	Used for the PAF Validated flag (or, more accurately, the “PAF not validated” flag). A value of “00” or “01” signifies that the address is PAF-validated and this flag is set to “N”. Otherwise the address has been manually input and the flag is set to “Y” for the EDG WS. Manual input captured as part of Kahala, the flag is set to “Y”.
8	Sender’s reference	M	<VLDT:>	D_S_REF	Used for the Last Despatch flag. Set to “Y” if the T&T item was posted after the last collection, else set to “N” (the default). [CP4034]
9	HALCON collection Id	M	<GroupId:>	D_FAD	The six-digit FAD code, with leading zeroes [CP4066], identifying the collection point.
11	Consignment weight	O	<Weight:>	D_WT	The weight of the T&T item in kg to 3 decimal places. This is converted to 100ths of a kg for the EDG WS rounded up, with no decimal places.
12	Value Of Goods	O	<VTTVOG:>	D_VG	The value of goods in pence. This is converted to pounds for the EDG WS by removing 2 least significant digits.
13	Consequential Loss Value	O	<VCLOss:>	D_CV	The value of ‘Consequential Loss’ in pence. This is converted to pounds for the EDG WS by removing 2 least significant digits.
15	Item Format	O	<VPiP:>	D_FOR	Item Format . D_FOR is omitted if <VPiP:> is omitted, empty or equal to “0” otherwise the input value is used.
16	Number of items	M	N/A	D_NO	Set to “1”.
17	Prepaid indicator	M	N/A	D_PRE	Set to “R”.
18	Consignee name	M	N/A	D_CN	Set to “Consignee Name”

19	Delivery address 1	O	<Address:> See below	D_DA1	The first line of the delivery address. For PAF validated addresses (<Result:>='00' or '01') concatenate either <Org:> or <POBox:> or <SubPrem:>, <BuildName:>, <BuildNum:> and <Thoro:>. For manual or 'smart post Kahala lookup' addresses concatenate <Premises:> and <Address:>. Separate each field by a space. In all cases truncate complete field to 30 char.
22	Delivery address 4	O	<Country:>	D_DA4	Full name of the destination country, truncated if necessary to 30 characters. [CP4107]
23	Delivery postcode	O	<Address:> See below.	D_DPC	The delivery address postcode.
24	Guaranteed Date	O	<VGuarant0:>	D_GTD	The Guaranteed Date. Format DD/MM/CCYY is converted to CCYYMMDD for EDG WS.
25	DD flag	O	<VGIND:>	D_GTF	The DD flag. Input value is used unless Guaranteed Date is not present when a space will be explicitly set.

Table 16 – Riposte Attribute Mapping to EDG WS Detailed Record Fields

The “Delivery address 1” and the “Delivery postcode” are derived from the PAF address Riposte attributes (see [PF/HLD/001]) under the following Riposte attribute:

<Data:
<MItem:
<VDestina:
<Address:...>

A PAF validated delivery address is identified by the following Riposte attribute having a value of “00” or “01”:

<Data:
<MItem:
<VDestina:
<Address:
<Result...>

In this case the PAF validated “Delivery address 1” field (D_DA1) is formed from the following organisation name Riposte attribute if it exists.

<Data:
<MItem:
<VDestina:
<Address:
<Org:...>

If the above attribute is absent the “Delivery address 1” field (D_DA1) is formed from the following PO Box Riposte attribute if it exists.

<Data:
 <MItem:
 <VDestina:
 <Address:
 <POBox:...>

If neither of the above attributes exist the “Delivery address 1” field (D_DA1) is formed from a concatenation of any of the following Riposte attributes that exist in the order they are described below with a space separating each attribute.

<Data:
 <MItem:
 <VDestina:
 <Address:
 <Subprem:...>
 <Buildname:...>
 <Buildnum:...>
 <Thoro:...>

The PAF validated “Delivery postcode” (D_DPC) is formed from the following Riposte attribute:

<Data:
 <MItem:
 <VDestina:
 <Address:
 <Postcode:...>

A value for the **<Data:<MItem:<VDestina:<Address:<Result:>** Riposte attribute other than “00” or “01” signifies that the PAF address has been manually entered. In this case the “Delivery address 1” (D_DA1) is formed from a concatenation of the following Riposte attributes in the order they are described below with a space separating each attribute.

<Data:
 <MItem:
 <VDestina:
 <Address:>
 <Premises:...>
 <Address:...>

The manually entered “Delivery postcode” (D_DPC) is formed from the following Riposte attribute:

<Data:
 <MItem:
 <VDestina:
 <Address:>
 <PostcodeZip:...>

The “Delivery address 1” field (D_DA1) is limited to 30 characters for the field definition in the AIS [AS/IFS/001]. Consequently, if the length of the XML value for this field derived from the above process exceeds this length it must be truncated to 30 characters.

An Ad Hoc Event record is created for each T&T item identified by the barcode for each T&T event in the comma separated list held in the <EV:> Riposte attribute.

Field No.	Field Name	Opt/Mand	Riposte Attribute	XML Tag	Description
1	Record type indicator	M	N/A	A_RTI	Set to “4”.
3	T&T number	M	<VBC:>	A_TT	The barcode for the T&T item.
4	Incident code	M	<EV:>	A_IC	The incident code for the T&T item retrieved from the comma separated list of incident codes held in the Riposte attribute.
5	Location	M	<Name:>	A_LOC	The name of the PO branch
6	Event date	M	<Date:>	A_ED	The date transacted at the Counter. This is held in the format “DD-MMM-YYYY” in the Riposte attribute but is converted to the format “YYMMDD” for the EDG WS.
7	Event time	M	<Time:>	A_ET	The time transacted at the Counter. This is held in the format “HH:MM:SS” in the Riposte attribute but is converted to the format “HHMMSS” for the EDG WS. GMT is converted to local time for the EDG WS.
8	FAD	M	<GroupId:>	A_FAD	Six digit FAD code with leading zeroes.

Table 17 – Riposte Attribute Mapping to EDG WS Ad Hoc Event Record Fields

The Trailer record requires no details from the Riposte attributes.

Field No.	Field Name	Opt/Mand	Riposte Attribute	XML Tag	Description
1	Record type indicator	M	N/A	T_RTI	Set to “9”.
3	Record count	M	N/A	T_CNT	Set to the number of records in the T&T message i.e. Header, Sender, Detailed and Trailer is 4.

Table 18 – Riposte Attribute Mapping to EDG WS Trailer Record Fields

The following validation is applied to the Riposte attributes XML as part of the formatting process to create the XML document to be sent to the EDG WS.

- Ensure that the required mandatory fields are present for the T&T message type (i.e. Detailed or Ad Hoc Event).

- The number of records for the T&T message type (i.e. Detailed or Ad Hoc Event) is checked against the value for the maximum number allowed held in the Registry (see Table 21).

If the T&T message fails this validation then the details are written to the T&T Exception table. The value extracted from each Riposte attribute XML is checked for the presence of the 5 special characters (<> & quote and double quote), and wherever present, each is escaped before the value is added to the XML document. The XML document created is passed as a parameter in a SOAP request that is sent to the EDG WS as an RPC over HTTP via TCP as detailed in the AIS [AS/IFS/001] and TIS [AS/IFS/002]. The interface to the EDG WS is defined by the WSDL file detailed in the Prism document [WSIS]. The location of this file is defined by a configurable Registry value (see Table 19).

The SOAP requests from the EE_IO threads are controlled by a number of configurable registry values (see Table 21). SOAP requests that are successfully received by the EDG WS are identified by <soap:Body> of the response containing the following (see [WSIS])

- <types:TntDocumentResponse /> identifying that the request was successful.
- The “<faultcode>” element of a “<soap:Fault>” having the value “soap:client” identifying that the SOAP request has been rejected by the EDG WS due to a fault in the SOAP document identified in the <faultstring> element of the “<soap:Fault>”

The Control thread is notified of the success or failure, along with the reason for the failure, by the EE_IO thread and the T&T Transaction table is updated accordingly by the Control thread. The EE_IO thread can then retrieve another T&T message from the queue managed by the Control thread. If there are no messages in the queue for the EE_IO thread to process the thread waits a configurable period before checking the queue again.

A SOAP request from the EE_IO thread is deemed to have failed if:

- The HTTP connection timeout value for the EE_IO thread is exceeded when trying to establish an HTTP connection to the EDG WS.
- The response timeout value for the EE_IO thread is exceeded when waiting for the SOAP response from the EDG WS.
- A SOAP response is received from the EDG WS signifying that the service is unavailable, identified by the “<faultcode>” element of the “<soap:Fault>” in the response having the value “soap:server”.

After a failed SOAP request the EE_IO thread waits for a specified delay and then attempts to resend the request. This process is repeated for the number of retries defined in the registry after which the EDG WS is considered to be “down” and the EE_IO thread suspends trying to resend the T&T message to the EDG WS.

Echo Test SOAP requests are initiated from the Ping thread when an EE_IO thread is the first to fail to send the SOAP request to the EDG WS for the specified number of retries. The other EE_IO threads that are running concurrently continue to attempt to send the SOAP requests they are currently processing when this happens for the specified number of retries. If any of these attempts are successful then the EDG WS is considered to be “up” and other EE_IO threads can resume processing and attempt to resend the requests that originally failed, with the retry count set back to zero. At this point the Echo Test requests from the Ping thread are suspended.

The EDG WS is also considered to be “up” when a configurable number of consecutive successful Echo Test requests have been achieved by the Ping thread in which case the EE_IO threads can resume processing the SOAP requests that originally failed.

5.1.3.3.3 Ping Thread

Echo Test SOAP requests are initiated from the Ping thread when:

- No T&T messages have been sent to the EDG WS for a configurable period of time.
- The EDG WS is identified as “down” by an EE_IO thread.

The Ping thread sends SOAP requests to the EDG WS at a regular configurable interval and receives a response in return identifying the status of the service. The format of the SOAP request is defined in the AIS [AS/IFS/001] and WSDL defined in [WSIS]. The SOAP request is successful if the <soap:Body> of the response contains <types:EchoTestResponse/>. The request is considered to have failed when:

- The HTTP connection timeout value for the Ping thread is exceeded when trying to establish an HTTP connection to the EDG WS.
- The response timeout value for the Ping thread is exceeded when waiting for the SOAP response from the EDG WS.
- A SOAP response is received from the EDG WS with a “<soap:Fault>” in “<soap:Body>” of the response either with a “<faultcode>” of “soap:server” indicating that the EDG WS is unavailable or a “<faultcode>” of “soap:client” identifying an error in the SOAP request sent.

If the Ping thread is sending Echo Test SOAP requests to the EDG WS when the Agent is in the idle state (i.e. there are no T&T messages to send to the EDG WS) and a configurable number of consecutive requests fail the EDG WS is considered to be “down”. Otherwise the Ping thread continues to send Echo Test SOAP requests to the EDG WS until there are T&T messages to send when the Echo Test SOAP requests are then suspended.

When the EDG WS is “down” a configurable number of consecutive successful Echo Test requests must be processed before the EDG WS is deemed to be up again. At this point the EE_IO threads can resume processing if there are T&T messages to send to the EDG WS or the Echo Test SOAP requests continue to monitor the state of the service if the Agent is in an idle state.

5.1.3.3.4 Microsoft SOAP Toolkit Version 3.0

Microsoft SOAP Toolkit Version 3.0 is used by the EE_IO threads to create the SOAP requests that are sent to the EDG WS as per the AIS [AS/IFS/001] and TIS [AS/IFS/002].

5.1.3.4 Exception Handling

The Agent will treat operational failures in the same manner as other Agents with all failures recorded in the NT event log.

Errors with the SOAP requests performed by the EE_IO threads are indicated using the “<soap:Fault>” element in the SOAP response from the EDG WS (see the AIS [AS/IFS/001] and TIS [AS/IFS/002] for details). Errors due to problems with the EDG WS are identified by the “<faultcode>” having the value “soap:server” which signifies that the service is

unavailable. Errors attributable to the badly formed SOAP requests sent to the EDG WS are identified by the “<faultcode>” element having the value “soap:client”. These are recorded as exceptions in the T&T Exceptions table with the “<faultstring>” element provides the description of the error.

Where the validation and formatting of the T&T messages performed by the EE_IO thread fails the Control thread is notified and the error details are written to the T&T Exceptions table along with the information held on the T&T Transaction table for the message in question according to the details in Section 5.3.2.3. The error is also reported in the NT event log. A limit to the maximum number of these events (i.e. 50) that can be recorded along with a time limit after which the count is reset if the event hasn’t occurred within this period (i.e. 1 hour), as applied to other Agents (i.e. the NBX Guaranteed Reversals Agent see [AD/LLD/005]), prevents an event storm in the event of a large number of exceptions

5.1.3.5 Performance and Scalability

The volumes for the T&T Integration are detailed in the CD [CR/CDE/018] with an expected peak of 12 Transactions per second. Four T&T EDG Interface Agents, one per Cluster, operate on the T&T Transaction table paired with the T&T Harvester Agents operating on the same Cluster Id.

The number of EE_IO Threads in the T&T EDG Interface Agents servicing the queue of T&T messages maintained by the Control thread is configurable (see Table 21). The flow of the T&T messages to the EDG WS can be adjusted here, although the scalability in terms of this Agent is dictated by the rate at which the EDG WS is able to process these requests. The suggested value of the number of EE_IO threads will have to be determined during development when the figures for the rate of the response from the EDG WS are available.

5.1.3.6 Resilience

The EACRR mechanism ensures that if an instance of the T&T EDG Interface Agent fails another one will take its place. When the Agent loses a connection to the Oracle NPS database it fails and a new instance tries to re-establish the connection. The aim of EACRR is to restart a failed Agent instance within 5 minutes or so.

Following a failure during the connection phase, the standard Agent approach of retries is appropriate; retries continue until the configured TOTAL_CONNECTION_TIMEOUT period has elapsed, after which the Agent fails. A timeout of the order of 5 minutes will be required so that EACRR may restart it on another T&T EDG Interface Agent Server well within the 15 minute period.

If when initialising the EE_IO or Ping threads the SOAP resources fail to initialise within the period specified in the registry (see “SOAP Initialisation Timeout” in Table 19) a warning is written to the Windows Event Log and the T&T EDG Interface Agent fails and is restarted via the EACRR mechanism.

If a response is received from the EDG WS by one of the EE_IO threads or the Ping thread signifying that the service is unavailable all transmissions to the service by the EE_IO threads are suspended until a response is received by the Ping thread identifying that the service is available again and transmissions by the EE_IO threads can resume.

The EE_IO thread records the time after each SOAP request or after checking the queue if it is empty and this time is used to identify the activity of these threads. If the interval between this time and the previously recorded time for the thread is greater than the configurable

period in the registry (see Table 21) then the thread is deemed to have failed. In this case the agent is stopped and restarted.

5.1.3.7 Security

The T&T EDG Interface Agent is hosted on the existing General Purpose FTMS Gateway Local Platform. This platform is located within a DMZ and is described in detail in the PPD [SD/DES/262]. The interface between this Agent and the EDG WS is described in the TIS [AS/IFS/002].

As there is no sensitive information in the T&T messages no encryption is required for the information sent to the EDG WS.

5.1.3.8 Configurability

The following table, though not exhaustive, lists the main items for the T&T EDG Interface Agent that are configurable through the Registry:

Item	Description
Cluster Id	The CLUSTERID value holds the number of the Riposte Cluster for this Agent instance that forms part of the selection criteria for reading the T&T Transaction table.
Database Location	The DBLOCATION value identifies the location of the NPS database (see [NB/HLD/027]).
Oracle User Name	The USERNAME value identifies the Oracle user name to connect to the NPS database (see [NB/HLD/027]).
Oracle Password	The PASSWORD value identifies the Oracle password for the user name that allows a connection to the NPS database.
NPS Connection Timeout	The TOTALCONNECTIONTIMEOUT value applies to the period after which the Agent exits when attempting to connect to the NPS database (5 minutes).
WSDL File Location	The location of the WSDL file that defines the interface with the EDG WS (D:\AgentData\WSDL\HorizonToEDG.wsdl).
SOAP Initialisation Timeout	The timeout for the initialisation of the SOAP resources that is applied to both the EE_IO and PING threads (1 minute).

Table 19 – Registry for T&T EDG Interface Agent

The following items are specific to the Control thread:

Item	Description
“Rehoming” Time	This defines the time of the day when the Agent is forced to close down and restart in order to attempt to connect to the preferred Correspondence Server and NPS node.
Queue High Threshold	The high threshold for the queue of T&T messages maintained by the Control thread (defined in the LLD [DE/LLD/015]).
Queue Low Threshold	The low threshold for the queue of T&T messages maintained by the Control thread (defined in the LLD [DE/LLD/015]).

NPS Read Wait	This is the period that the Control thread waits before reading the T&T Transaction table again when there are no T&T messages to process.
Heartbeat Interval	This is the interval between heartbeat MONID events being generated confirming that the Agent is available (5 minutes).
Stats Folder	This identifies the folder containing the files where the stats information is written (D:\AgentData\Stats).
Stats Interval	This is the interval for which the stats information is written to records on the stats files in the stats folder (5 minutes).

Table 20 – Registry for T&T EDG Interface Agent – Control Thread

The following items are specific to the EE_IO threads:

Item	Description
Number of EE_IO Threads	The number of EE_IO threads available to process the T&T messages held in the queue by the Control thread.
HTTP Connection Timeout	The timeout applied to establishing an HTTP connection by the EE_IO thread (set to 25 seconds).
SOAP Response Timeout	The timeout applied to waiting for the response EDG WS for the SOAP request sent by the EE_IO Thread (FS proposal 20 seconds, see TIS [AS/IFS/002]).
Retry Count	The number of attempted retries to send the T&T message to the EDG WS by the EE_IO thread before the process is deemed to have failed (set to 5, see TIS [AS/IFS/002]).
Retry Wait	The delay before the EE_IO thread attempts to resend the T&T message (set to 2 seconds; see TIS [AS/IFS/002]).
Maximum number of Detailed Records	The maximum number of Detailed records as defined by the AIS [AS/IFS/001] that are allowed for the T&T XML document sent to the EDG WS (set to 10, see AIS [AS/IFS/001]).
Maximum Number of Ad-Hoc Records	The maximum number of Ad-Hoc records as defined by the AIS [AS/IFS/001] that are allowed for the XML document sent to the EDG WS (set to 50, see AIS [AS/IFS/001]).
Idle Wait	The period the EE_IO thread waits when there are no T&T messages in the queue maintained by the Control thread before checking the queue again (set to 0.5 seconds).

Table 21 – Registry for T&T EDG Interface Agent – EE_IO Thread

The following items are specific to the Ping thread:

Item	Description
Idle Time	The time that has elapsed during which no SOAP requests have been sent to the EDG WS before Echo Test SOAP requests are initiated by the Ping thread (set to 60 seconds; see TIS [AS/IFS/002]).

Echo Test Interval	The interval between Echo Test requests being sent to the EDG WS (set to 30 seconds; see TIS [AS/IFS/002]).
HTTP Connection Timeout	The timeout applied to establishing an HTTP connection by the Ping thread (set to 25 seconds).
SOAP Response Timeout	The timeout applied to waiting for the response from the EDG WS for the Echo Test SOAP request sent by the Ping Thread (set to 20 seconds; see TIS [AS/IFS/002]).
Retry Count	The number of attempted retries to send the Echo Test request to the EDG WS by the Ping thread before the process is deemed to have failed and the EDG WS is considered to be “down” (set to 3, see TIS [AS/IFS/002]).
Success Count	The number of consecutive successful Echo Test SOAP requests for the EDG WS to be considered up again when in the “down” state (set to 6; see TIS [AS/IFS/002]).
Idle Wait	The period the Ping thread waits when it has no work to do when the EE_IO threads are processing the T&T messages normally (set to 2 seconds).

Table 22 – Registry for T&T EDG Interface Agent – Ping Thread**5.1.3.9 Audit**

The information held on the T&T Transaction and T&T Exceptions tables on NPS provides the means for auditing the T&T EDG Interface Agent. The T&T Transaction and Exceptions tables are archived as part of the NPS archiving and housekeeping process (see [NB/HLD/027]).

Statistics are maintained by the Control thread in files named after the day of the week along with the Cluster Id the Agent is servicing (i.e. *Monday_<n>* where <n> identifies the Cluster Id) in the folder specified in the registry (see Table 20). These files are created at midnight with the new file for the day and Cluster Id overwriting the existing file. The statistics are written to these files after a configurable interval held in the registry, based on the difference between the current statistics values and those written last time. The following information is collected by the Control, EE_IO and Ping threads and recorded to the statistics files (the structure of these files is defined in the LLD [DE/LLD/015]).

For the Control thread:

- The number of T&T messages read from the T&T Transaction table on the NPS database.
- The number of T&T messages accepted by the EDG WS.
- The number of T&T messages that failed either in the validation or by rejection from the EDG WS resulting in a record being written to the T&T Exception table.

For the EE_IO thread the figures are the sum of the following for all the EE_IO threads operating:

- The number of SOAP requests sent to the EDG WS including retries.

- The total number of SOAP requests that failed due to either failing validation when building the XML document to send or being rejected by the EDG WS or timing out at the Agent waiting for a response or the EDG WS being sending a response identifying that it is unavailable.
- The number of SOAP requests rejected by the EDG WS identified by the SOAP response “<soap:Fault> element having a “<faultcode>” of “soap:client”.
- The number of T&T messages failing validation in the EE_IO thread whilst building the XML document to send to the EDG WS.
- The number of SOAP requests that failed due to timing out when the Agent is waiting for the response from the EDG WS.
- The number of SOAP requests that failed due to the EDG WS being “down” identified by the SOAP response “<soap:Fault> element having a “faultcode” of “soap:server”.
- The total number of characters in the T&T messages successfully sent to the EDG WS.

For the Ping thread:

- The number of Echo Test SOAP requests sent to the EDG WS including retries.
- The total number of Echo Test SOAP requests that failed due to the EDG WS being “down” identified by either the SOAP response “<soap:Fault> element having a “faultcode” of “soap:server” or the requests timing out.
- The number of Echo Test SOAP requests that failed due to timing out when the Agent is waiting for the response from the EDG WS.
- The number of Echo Test SOAP requests that failed due to the EDG WS returning a SOAP response with the “<soap:Fault> element having a “faultcode” of “soap:server”.

5.1.1.10 Operational Summary

Agent name: TT_NQ_EDG	Platform(s): EDG General Purpose FTMS Gateway Local
Service Name: TMSTTEDGInf<n>	Style: Interactive Enquiry Agent
Scope & parallelism: One per Cluster where <n> identifies the Cluster id.	
Registry key(s): HKEY_LOCAL_MACHINE\SOFTWARE\MCL\PathwayAgents\TT_NQ_EDG HKEY_LOCAL_MACHINE\SOFTWARE\MCL\PathwayAgents\TT_NQ_EDG\TMSTTEDGInf<n>	
Use of checkpoints: None.	
Use of dummy offices: None.	
Host database: NPS	
Needs to be running: Runs 7 x 24. Important between 07:00 and 20:00 7 days per week; Critical between 08:00 and 17:30 Monday to Friday and 08:00 and 13:00 Saturday.	
Documentation: [DE/LLD/015]	

Table 23 – Operational Summary of the T&T EDG Interface Agent

5.2 Application Components for Existing Agents

5.2.1 Counter Call Scheduler (CCS) Agent Configuration

T&T messages are to be treated at the Counter as 'urgent'. This entails the configuration of the CCS through type D reference data to ensure that the T&T messages recorded at the Counter identified by the Riposte attribute <TTA:1> are treated as such. The maximum interval for this process is set to 5 minutes and the minimum interval is set to 4 minutes to ensure this is the case.

5.3 Interfaces to External Components

5.3.1 Interfaces to Riposte

The Riposte attribute grammar is described in detail in the Counter HLD [DE/HLD/014]. The Riposte attributes required for the EDG WS and the interface between the T&T Harvester Agent and the Correspondence Servers are described in Section 5.1.2.

5.3.2 Interfaces to NPS

5.3.2.1 Overview

The following two tables are required on NPS for the T&T Integration messages harvested by the T&T Harvester Agent from the Correspondence Servers so that the messages can then be sent to the EDG WS via the T&T EDG Interface Agent.

Table	Table Name	Description
T&T Transaction Table	TMS_RX_TT_TRANSACTIONS	This table holds the T&T messages harvested by the T&T Harvester Agent that are then validated, formatted and sent to the EDG WS by the T&T EDG Interface Agent.
T&T Exceptions Table	TMS_RX_TT_EXCEPTIONS	This table holds any exceptions generated by the T&T Harvester being unable to harvest the T&T message from the Correspondence Server or T&T messages failing validation by the T&T EDG Interface Agent or being rejected by the EDG WS.

Table 24 – NPS Tables for T&T Agents

The design for these tables is described in detail in the NPS T&T Changes HLD [NB/HLD/027]. The T&T Harvester and EDG Interface Agents process the T&T messages held on the Correspondence Servers by Cluster. The Agent pairs processing a specific Cluster Id preferably connect to the same Oracle NPS database using the same Oracle instance to avoid block pinging between these instances. In practice as these Agent pairs may start or restart at different times and the NPS availability may change in between, this may not be the case.

Both the T&T Agents use the “Rehoming” approach that is considered acceptable for NBX by forcing the Agents to close down and restart overnight allowing the Agents to attempt to reconnect to the preferred NPS database and Oracle Instance if they are not already using

them. As the NPS has a hot backup (i.e. the NPS is not taken down to be backed up) this process is not triggered by the Agents losing their connection to the NPS.

The T&T EDG Interface Agent is configured to “Rehome” by the Control thread closing down the Agent at the time defined within the registry.

The T&T Harvester Agent is configured to “Rehome” by the Agent closing down after it has taken the Backup checkpoint before the Correspondence Servers are backed up.

This section describes how the tables in the NPS are populated and used by the T&T Agents.

5.3.2.2 T&T Transaction Table (TMS_RX_TT_TRANSACTIONS)

The T&T Transaction table is populated by the T&T Harvester Agent from the T&T messages held on the Correspondence Servers. The Riposte attributes in these messages required for EDG WS (as specified in the AIS [AS/IFS/001]) are identified in an inclusion list (see Table 11). These Riposte attributes are converted to XML and written to the table along with the fields identified in Table 25. The messages held on the T&T Transaction table are then read by the T&T EDG Interface Agent before they are validated, formatted and sent to the EDG WS.

The following table lists the Oracle column names for this table (see [NB/HLD/027]) and describes their purpose with respect to the T&T Agents:

Oracle Column Name	Field	Purpose for T&T Agents
SEQ_NUMBER	Sequence number within Cluster.	The sequence number uniquely identifies transactions within each Cluster. This defines the order in which the messages were written to the table and allows the use of a high water mark within the processing performed by the T&T EDG Interface Agent.
CLUSTER_ID	Cluster Id.	The T&T Harvester and EDG Interface Agents run with one agent per Cluster. The Cluster Id here allows the T&T EDG Interface Agents to select a specific Cluster to process from the T&T Transaction table.
TRANSACTION_ID	Transaction Id.	The Transaction Id provides a means of uniquely identifying the T&T messages recorded at the Counter and held on the Correspondence Servers. This is used to ensure that T&T Transactions aren't duplicated. This is the EPOSS Transaction Id for the T&T messages that are currently being processed, but could be any unique Transaction Id that uniquely identifies the T&T message recorded at the Counter.
INSERT_TSMP	Timestamp when record was inserted into the table.	This is the current date and time when the record is written to the table by the T&T Harvester Agent.
TT_MESSAGE	T&T message.	The T&T Harvester Agent converts the T&T message harvested from the Correspondence Server to XML so that the T&T message can then be retrieved formatted and sent to the EDG WS by the T&T EDG Interface Agent.

ACTIONED	Actioned Flag (Y/N)	This flag defaults to “N” when the T&T message is written to the table by the T&T Harvester Agent and is set to “Y” when the record has been sent to the EDG by the T&T EDG Interface Agent and confirmation has been received by the Agent.
UPDATE_TSMP	Timestamp when record was Actioned.	The updated timestamp is set to the current date and time when the T&T message record has been passed to the EDG by the T&T EDG Interface Agent and the Actioned flag is set to “Y”.

Table 25 – T&T Transaction Table (TMS_RX_TT_TRANSACTIONS)**5.3.2.3 T&T Exceptions Table (TMS_RX_TT_EXCEPTIONS)**

The T&T Exceptions table is populated with T&T messages from the Correspondence Servers that the T&T Harvester Agent is unable to process and by the T&T EDG Interface Agent where T&T messages held on the T&T Transaction table fail validation or are rejected by the EDG WS. This is likely to be a sparsely populated table as there is little validation performed on the T&T messages within these Agents, validation of the T&T information mainly occurs at the EDG WS (see Sections 5.1.2.4 and 5.1.3.4).

The following table lists the Oracle column names for this table (see [NB/HLD/027]) and describes their purpose with respect to the T&T Agents:

Oracle Column Name	Field	Purpose for T&T Agents
SEQ_NUMBER	Sequence number within cluster.	This value is taken from the T&T Transaction table for T&T EDG Interface Agent exceptions. However, this sequence number does not exist for exceptions with the T&T Harvester Agent.
CLUSTER_ID	Cluster Id.	This value is taken from the T&T Transaction table for T&T EDG Interface Agent exceptions and from the Cluster Id being processed for T&T Harvester Agent exceptions.
TRANSACTION_ID	Transaction Id.	This value is taken from the T&T Transaction table for T&T EDG Interface Agent exceptions and from the <TxnId:> Riposte attribute from the T&T message on the Correspondence Servers for T&T Harvester Agent exceptions.
INSERT_TSMP	Timestamp when record was inserted into the table.	This is the current date and time when the record is written to the table by the T&T Harvester/EDG Interface Agent.
TT_MESSAGE	T&T message.	The T&T message from the Correspondence Servers for exceptions with the T&T Harvester Agent and the T&T message field (TT_MESSAGE) from the T&T Transaction table for exceptions with the T&T EDG Interface Agent.
ACTIONED	Actioned Flag (Y/N)	The Actioned flag defaults to “N”.
UPDATE_TSMP	Timestamp when record was Actioned.	This field is not used.
EXCEPTION_DETAILS	Exception details.	This provides details of the reason the exception occurred.

ALERT_RAISED	Alert raised flag	This flag identifies whether an alert has been raised for the exception.
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Table 26 – T&T Exceptions Table (TMS_RX_TT_EXCEPTIONS)

5.3.2.4 NPS Archiving and Housekeeping

The NPS Archiving and Housekeeping process runs every night and archives and removes all records that have been processed (ACTIONED = “Y”) from the T&T Transaction table where the insert timestamp (INSERT_TSMP) is older than a specified period (5 days). This process is described in detail in the NPS T&T Changes HLD [NB/HLD/027].

5.3.3 Interfaces to the EDG WS

The interface to the EDG WS is described in the AIS [AS/IFS/001] and TIS [AS/IFS/002]. This interface is effectively managed within the T&T EDG Interface Agent. SOAP requests are sent to the EDG WS by this Agent via RPC using an HTTP connection and the availability of the service is identified by the responses received from these requests. The EDG WS is deemed to be unavailable if a SOAP request consistently times out for the specified number of retries or if the response received from the EDG WS explicitly states that the service is unavailable identified by a SOAP “faultcode” of “soap:server”. This can occur in either the EE_IO threads or the Ping thread and entails the suspension of all processing of the T&T messages by the EE_IO threads until the Ping thread receives a response from the EDG WS that confirms that the service is available again.(see Section 5.1.3).

6.0 Systems Management

6.1 NT Events as a Source for Monitoring

The T&T Harvester and EDG Interface Agents generate specific events that are monitored to provide information on the health of the service itself and the resources upon which the Agents are dependent.

Each event has an associated “severity level”, for which the keyword is “MONSEV:”. The severity levels used are given in the following table.

Severity Level	Value
Good	G
Bad	B

Table 27 – Monitor Severity Levels

The monitored resources are identified by their monitor id included in the text of the event message by the keyword “MONID:”. The monitor id is limited to 20 characters and the resources being monitored, and their associated monitor ids, are given in the following tables.

The standard Agent monitoring for a Harvester Agent as defined in [AD/DES/039] is applied to the T&T Harvester Agent; however, the following Heartbeat “MONID” is produced by the Agent to confirm that the Agent is running. In the following tables <n> identifies the Cluster

Id that the Agent is servicing (i.e. for the T&T Harvester Agent for Cluster Id 1 the Monitor Id will be TTHarvester1.HB for the heartbeat resource)

Resource	Monitor Id
T&T Harvester Heartbeat	TTHarvester<n>.HB

Table 28 – Monitor Ids of the Resources for the T&T Harvester Agent

Resource	Monitor Id
T&T EDG Interface Service	TTEDGInf<n>.SERVICE
T&T EDG Interface Heartbeat	TTEDGInf<n>.HB
NPS Database	TTEDGInf<n>.DB1
EDG WS	TTEDGInf<n>.EDGWS

Table 29 – Monitor Ids of the Resources for the T&T EDG Interface Agent

The following table gives the meanings of the monitored NT events. To aid the filtering process, they will be assigned their own facility code and will use a reserved range of event numbers (8000 to 9999).

Resource	Severity Level	Description
T&T Harvester Heartbeat	Good	Service is available. Generated at a configurable interval (see Table 10) providing a heartbeat for the service.

Table 30 – NT Events for Monitoring the T&T Harvester Agents

Resource	Severity Level	Description
T&T EDG Interface Service	Good	Service is available. Generated by the Control thread when it first starts.
	Bad	Service is closing: <i>reason</i> Generated by the Control thread before the Agent is closed down.
T&T EDG Interface Heartbeat	Good	Service is available. Generated at a configurable interval (see Table 20) by the Control thread providing a heartbeat for the service.
NPS Database	Good	NPS database is available. Generated after the Control thread makes a connection to an NPS instance.

	Bad	NPS database is unavailable: <i>reason</i> Generated by the Control thread after it loses the connection to the NPS instance before the Agent closes down.
EDG WS	Good	EDG WS is available. Generated by the Ping thread when the EDG WS is identified as being “up” either when the Agent first starts or when the EDG WS has been “down” (see Section 5.1.3.3.3).
	Bad	EDG WS is unavailable: <i>reason</i> . Generated by the Ping thread when Echo Test SOAP requests are initiated to check the status of the service when it is “down” (see Section 5.1.3.3.3).

Table 31 – NT Events for Monitoring the T&T EDG Interface Agents

It is possible for more than one instance of these Agents to be started up for the same Cluster Id due to failure conditions such as network problems causing a second instance to start up. Although two T&T Harvester Agents running for the same Cluster Id doesn't cause a problem as only unique transactions are written to the T&T Transaction table (duplicates are ignored) and two T&T EDG Interface Agents running against the same Cluster Id also doesn't cause a problem as there are no restrictions on resending the same T&T message to the EDG WS, a monitoring view should raise alarms if two of the same type of Agent are running against the same Cluster Id. When Tivoli notices this, which it usually does once the problem has been resolved, it will close both agents down and restart the Agent for the Cluster Id in question.

6.2 T&T Eventing Requirement

There are two eventing requirements for the T&T Agents:

- Event filtering - there is a requirement to link events raised by the Agent services using generic event sources with a particular Agent instance.
- Certain events need to be forwarded to the TEC via the expedited eventing route.

6.2.1 Event Filtering

There is a requirement to link events raised by the Agent services using generic event sources with a particular Agent instance.

There are two Agent types delivered as part of the track and trace solution: an interface agent and a harvester agent.

All POA Agents include the Agent service name (see Table 33) within angle parenthesis ‘<>’ at the start of the event text. For example:

<TMSTTEDGInf3>Agent terminated after shutdown request.

The event is raised with a source of TT_NQ_EDG. The number at the end of the string included within the angle parenthesis indicates the instance number of the Agent. The filter should change the event source from TT_NQ_EDG to TTEDGInf<n>, where <n> identifies

the instance number and the TMS prefix included within the event text is removed. In the example above the source would become TTEDGInf3.

The event filter needs to make the following changes:

Event Source	Text Included Within Event Message	New Event Source
TT_NQ_EDG	<TMSTTEDGInf1>	TTEDGInf1
TT_NQ_EDG	<TMSTTEDGInf2>	TTEDGInf2
TT_NQ_EDG	<TMSTTEDGInf3>	TTEDGInf3
TT_NQ_EDG	<TMSTTEDGInf4>	TTEDGInf4
TT_HV_ALL	<TMSTTHarvester1>	TTHarvester1
TT_HV_ALL	<TMSTTHarvester2>	TTHarvester2
TT_HV_ALL	<TMSTTHarvester3>	TTHarvester3
TT_HV_ALL	<TMSTTHarvester4>	TTHarvester4

Table 32 – T&T Event Filtering Changes

Given all PO accounts utilise the same scheme within all Agents the filter should be developed to maximise the potential for reuse, whilst not incurring a large development cost.

The cost of development will be funded by the 10 man day T&T filtering impact included in the original T&T budget.

6.1.2 Expedited Eventing

Both the T&T Harvester and EDG Interface Agents raise regular heartbeat events to show that they are still active. This is required to protect against the effects of ‘sleepy Agent’ syndrome, i.e. the service is reported as being up and running but is not actually processing messages.

The expedited eventing route was introduced to support the delivery of these style of messages.

The following changes are required in order to support the use of expedited eventing by the T&T Harvester and EDG Interface Agents. Note that there will be no change to the actual Agents, the route an individual event will be forwarded by will be defined by a local event filter. The changes are:

1. Introduce a new instance of the Windows 2000 event adapter.
2. Filter the heartbeat events so they will not be picked up by the existing event adapter.
3. Filter the new adapter to just process the heartbeat events.

Details of heartbeat events to be forwarded by the expedited route:

Source: TT_NQ_EDG, event id: 8030, example event text contains: MONID:TTEDGInf3.HB

Source: TT_HV_ALL, event id: 8030, example event text contains: MONID:TTHarvester3.HB

7.0 Application Development

The normal Agent development environment is adequate for most of the development and unit testing.

An emulator is required for the external EDG WS which will receive the SOAP requests and produce the relevant responses to provide a suitable environment to the unit test the T&T EDG Interface Agent.

8.0 System Qualities

8.1 Performance and Scalability

8.1.1 T&T Harvester Agent

See Section 5.1.2.5.

8.1.2 T&T EDG Interface Agent

See Section 5.1.3.5.

8.2 Resilience

8.2.1 Resilience to a Failing Correspondence Server

The T&T Harvester Agent is configured with a Resilient Locale. If the Riposte connection to a Correspondence Server fails, this Agent will fail and wait to be restarted by Tivoli EACRR mechanisms. During the connection phase, it will attempt to connect to the preferred Correspondence Server, but if that is not possible it will connect to the alternative instead.

8.2.2 Resilience to a Failed Connection to NPS

Both the T&T Harvester and T&T EDG Interface Agents connect to NPS to get access to the T&T Transaction and Exceptions tables. If the connection to NPS fails then the Agent will fail and wait to be started by Tivoli EACRR mechanisms. Details of the approach taken to connect to NPS are described in Section 5.3.2.

8.2.3 T&T Harvester Agent

See Section 5.1.2.6.

8.2.4 T&T EDG Interface Agent

See Section 5.1.3.6.

8.3 Security

8.3.1 T&T Harvester Agent

See Section 5.1.2.7.

8.3.2 T&T EDG Interface Agent

See Section 5.1.3.7.

8.3.3 Service Users

The Secure Build Implementation Guide [RS/DES/081] defines that all Service User accounts must be created using the global group and local group model with the minimum level of privileges being assigned in order to achieve the required functionality. The standard for such Service Users is to create them in the local resource domain as domain users.

These standards apply to the new T&T Integration Agents which run as NT services. The following table lists the proposed Service User names:

Agent	Platform	Service Name	Service User
T&T Harvester Agent	NBX Routing Agent Server	TMSTTHarvester<n>	TMSTTHarvester
T&T EDG Interface Agent	T&T EDG Interface Agent Server	TMSTTEDGInf<n>	TMSTTEDGInf

Table 33 – Service Users for T&T Integration Agents

8.4 Potential for Change

The design for the T&T Harvester and EDG Interface Agents defined here has attempted to build in the potential for change by continuing the approach of previous Agents. As part of this process the intention is to make configurable as much as is possible for these Agents.

9.0 Solution Implementation Strategy

The functionality described here for the T&T Harvester and T&T EDG Interface Agents is to be released at BI3 S80 except where specifically stated to the contrary.

10.0 Migration

As the T&T Integration Agents are new for BI3 S80 there are no migration issues envisaged for these Agents.