A Guide to the Departmental Integration Service (DIS)

Background

The Government Gateway acts as an intelligent hub, providing a common set of components that help to deliver online government services – national, regional and local. It is responsible for verifying the integrity, validity and authenticity of submitted transactions, and for routing them on from the Gateway to appropriate organisations.

The departmental integration service, DIS, is used to interface between the open-interoperability standards of the Gateway and existing information systems in use in connecting organisations. DIS also provides the means of guaranteed once-only delivery between the Gateway and connecting organisations. It supports open-standards interoperability between the Gateway and the connecting organisation – through the use of GovTalk-compliant XML and SOAP – and offers various options for integration into the organisation's own systems, ranging from the open-interoperability standards of HTTP and XML through to proprietary integration requirements.

Once an incoming submission has been safely delivered from the Gateway to an organisation's DIS, DIS then transfers that submission to the organisation's own information systems. Servers inside the connecting organisation process the transaction and send their response back to DIS for forwarding to the Gateway. The Gateway correlates each response with the original document submission and forwards it onto the originator. This process can take seconds, minutes, hours or even days depending on the transaction type and the profile of the business processes that need to be conducted within each connected organisation when a new submission is received.

By providing a common access point for individuals and businesses to communicate with different organisations, the Gateway facilitates joined-up working between all participants. This allows all related Gateway organisations to communicate with their electronic business users and citizens via the same mechanism.

It is the responsibility of participating organisations to decide which transactions can be accepted electronically by the Gateway and, in conjunction with the Gateway service provider, to devise the business rules associated with each type of transaction.

Gateway XML

In accordance with the e-GIF (electronic-Government Interoperability Framework) the Gateway only accepts and generates GovTalk compliant eXtensible Mark-up Language (XML). GovTalk schema are the formal specification of the elements and attributes that are allowed within a particular class of document that can be submitted to the Gateway. They describe how those elements and attributes are related to each other and the sequence in which they must appear. More information about GovTalk, including schema samples, can be found at http://www.govtalk.gov.uk

For a fuller overview of XML in general and the use of schema see the XML Schema Primer at http://www.w3.org/TR/xmlschema-0/

Mapping Gateway XML to Local Data Standards

In order to be able to carry out electronic business transactions and communicate with their customers over the Internet, organisations must be able to link their existing servers successfully with the Gateway. The Gateway provides a standardised, open-standards interoperability endpoint for documents, regardless of the business content, owner, business rules and ultimate backend platform. The DIS service is a key component in providing an interface between the open interoperability standards of the Gateway and an organisation's local servers.

DIS enables a dedicated link to be established between each organisation's systems and the Gateway, providing guaranteed two-way communication and once-only delivery of documents between the two. It ensures there are clear demarcation lines between the boundaries of the Gateway system and the

participating organisations' back-end systems. It also provides an audit trail of Gateway transactions showing their safe receipt or dispatch.

Since it uses a dedicated two-way communications link, use of DIS means that submission of documents to the Gateway does not need to use the document submission and polling protocol.

Each organisation's means of communication and interaction with the Gateway is implementation specific, usually comprising Intranet or Internet connectivity using industry standard Hypertext Transfer Protocol (HTTP), or HTTP/S. In a typical scenario, documents are sent to the Gateway by a business or citizen. The Gateway then verifies the integrity of the document, authenticates the credentials used to sign it and forwards the transaction to the DIS belonging to the appropriate organisation(s). The DIS then transforms the XML document as appropriate and routes it to the local servers belonging to the organisation, using that organisation's preferred format (such as flat file for a mainframe) and delivery mechanism.

A high-level overview of how DIS installations interact with the Gateway is shown below.
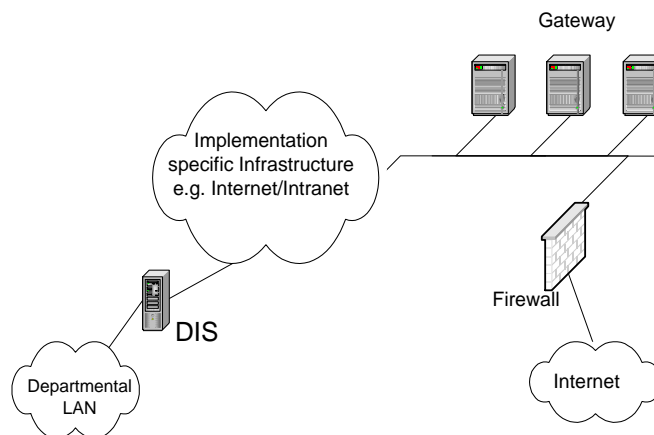
DIS provides communications between the Gateway and the participating organisations, and interoperability between the XML required by the Gateway and the local data format needs of the organisations' systems. DIS is able to map from XML to a wide variety of data formats, transforming relevant XML schema to the back-end organisation's data-specific interface requirements. This mapping enables DIS to simplify the integration of data between the Gateway and the organisations' local systems. Data ranging from key extract information, which the organisations need to supply to the Gateway in order for users of the system to be authenticated, to the exchange of business specific forms can all be passed through the Gateway via DIS.

Data Flow

A typical flow of data through DIS is as follows:

- DIS receives an XML message from the Gateway that conforms to the appropriate GovTalk schema for that particular type of transaction. This message includes a unique handle, known as the CorrelationID, which identifies that message to the system
- DIS validates and translates the XML message into the appropriate local data format used by the target organisation and passes the message onto that organisation's local server for processing
- The organisation's local server processes the message and, where appropriate, sends a response back to DIS
- DIS translates the local server's response into Gateway XML format, validates and digitally signs the response (where appropriate) and routes it back to the Gateway for final processing and correlation with the original message

This data flow is illustrated below.

Department Integration Service
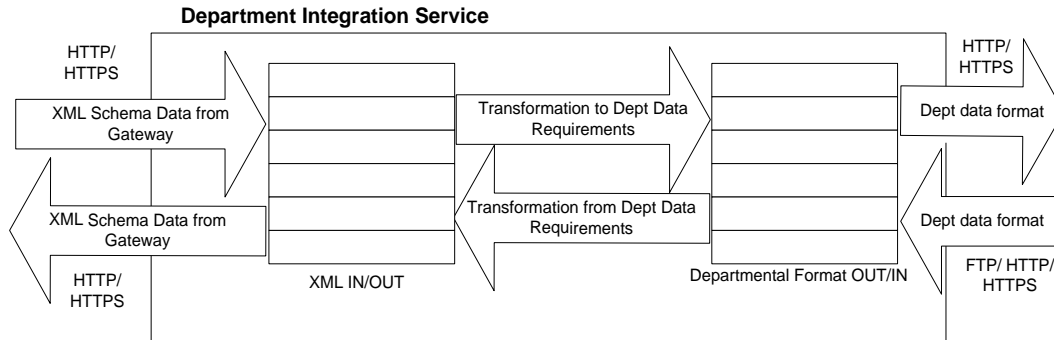
Specific DIS to organisation interfaces and data exchanges must be developed on an organisation by organisation basis as each organisation comes on-line with the Gateway in a manner relevant to each organisation's specific needs. An initial set of generic interface requirements is provided with the basic DIS. Each organisation can use these generic descriptions to create their own organisation-specific interfaces to DIS in order to be able to successfully connect to and interact with the Gateway. A range of adaptors are also optionally available for DIS to expedite and simplify integration to a wide variety of technologies and applications. An indication of these adaptors is included in Appendix 1.

This interoperability offered by DIS, between the Gateway's GovTalk XML format and the local data formats in use within the organisations, ensures that each organisation's existing 'back-end' systems can be linked to the Gateway as simply and efficiently as possible. Organisations will be able to get on-line and integrate their electronic services with the Gateway as quickly as possible with minimal impact on both themselves and the Gateway.

Overview of Key DIS Features

The following briefly outlines the key features of DIS.

Delivery Mechanisms

DIS uses HTTP Post to deliver documents to the owning organisation and to the Gateway. DIS receives administration documents from the organisation via HTTP Post. DIS receives Known Facts Extracts (full and updates) via FTP or HTTP from organisations. These are delivered to a known location on the Gateway.

Reliable Messaging

Reliable Messaging between DIS and Gateway is implemented. When a document is sent between DIS and the Gateway (or vice versa) one of the following events must happen:

- the document is delivered exactly once
- the document is not delivered and the source server is notified that delivery failed

Reliable messaging between an organisation and the DIS itself is provided, in accordance with the Gateway Protocol, both synchronously and asynchronously.

Security

In order to support the Hub and Spoke architecture, the DIS (from release 1.5 onwards) will be able to sign outgoing business and admin messages with its own Gateway recognised certificate. This will be a Gateway requirement, but will also enable organisations to operate their DIS on the Gateway as an Internet-enabled spoke if they so wish.

Under an Internet Hub and Spoke infrastructure, DIS will be able to secure its traffic using mutual SSL or VPN thus ensuring received traffic is from the Gateway and the transport is secured.

Auditing

In addition to standard Windows event logging DIS provides an audit capability which logs events to a DIS specific database. Audit entries are written by DIS in the following circumstances:

- receipt of an incoming document from the Gateway

- receipt of an incoming document from the department back-end system
- receipt of an incoming Known Facts documents from the department back-end system via FTP
- successful transmission of a document to the back-end system
- failed attempt to transmit a document to the back-end system
- organisation responded with a Resend request (a recoverable error response) to the transmission of a document to the back-end system. This resend facility is available only for documents which are responded to synchronously – and is only ever required where an organisation's system has been unable to persist an incoming document due to an internal fatal error.
- flow control service has automatically stopped the flow of documents to the back-end system
- the flow control service has restarted the flow of documents to the back-end system on request by the user
- the flow control service has stopped the flow of documents to the back-end system on request by the user

DIS Provisioning

A DIS configuration facility allows a privileged user to perform reconfiguration of the DIS system. The primary function of this facility is to configure a DIS to fulfil the specific requirements of an organisation. It also enables the ongoing maintenance of that configuration – such as the addition of new services. Since this service is web-enabled it could be executed remotely should the controlling organisation require this.

It supports the creation/deletion/updating of the following:

- a new drop directory
- a receive function
- channels, ports, document definitions, maps and envelopes
- associated map and document specification files in the Server Repository
- the DIS database configuration table

As part of this functionality the DIS provisioning facility also enables the configuration of the following features:

- configuration of the interval between, and number, of transmission attempts after a communications failure
- activation/deactivation of conversion/translation, as well as defining the actual translation
- activation/deactivation of validation, as well as defining the actual validation schema
- setting the DIS to expect either asynchronous or synchronous responses from the organisation
- optionally setting a separate location for sending large files, and the threshold above which to send it
- setting a tuneable timeout dynamically varied according to the size of the document, for the transmission of documents to departments
- configure which portion of the document is recorded in the audit trail for the document
- use of a certificate to digitally sign documents

Event Notification

DIS can use the Simple Network Management Protocol (SNMP) and/or Simple Mail Transport Protocol (SMTP) to notify organisations should certain events occur. SNMP is a generic and widely-used network management system that works over IP and other-protocol networks. It enables devices to be managed remotely from a single management console. SNMP alerts can be raised by DIS to enable either hardware problems or errors in message transmission to be notified to operations within a given organisation.

The framework within which SNMP or STMP is used by DIS is subject to appropriate firewall configurations. The method to be used for event notifications can be selected when a DIS system is installed and configured, or modified after installation.

Flow Control Component

There is an optional Flow Control component supplied with the DIS software, which allows an organisation to instruct the DIS to stop sending messages. The messages are held on the DIS and can be released later via another instruction. The flow control component provides the following functionality:

- monitors the Suspended queue and reacts to Suspended queue events
- automatically stops the flow of messages to an organisation if a document, which is not recorded in the resend-entries table, reaches the Suspended queue with a transmission failure reason code

- automatically resends a message to an organisation if a document, which is recorded in the resend-entries table, reaches the Suspended queue with a transmission failure reason code
- provides support for the flow control start and stop functions to set or reset the appropriate database table entry
- creates and sends an e-mail to the nominated administrator when the flow is automatically stopped, using the SMTP service.
- raises an SNMP event trap when the flow is automatically stopped, using the DIS SNMP component.
- raises events which allow a client monitor program to monitor the operation of the Suspended queue, if required

Document Validation

Optionally DIS can be set to validate documents for conformance to XML formatting and size rules. Failed documents are rejected and returned to the originators. This enables ownership for resolution of any badly generated documents to be placed back at the originating owner.

Document Mapping

One of the primary purposes of the DIS is to translate organisation-specific formats to standardised, GovTalk-compliant XML. This may be done by using the Mapping function. The known facts files are the most common case in point – they frequently originate from organisations as a comma-separated flat file, but are translated by DIS to a GovTalk XML message.

Simulating a Target Organisation or Gateway

DIS provides a minimal capability to simulate a target organisation or Gateway. In a test situation, working pages can be set to point to dummy Responder pages on the DIS machine. These pages receive XML from DIS and write it to disk where it can be inspected. They also can be set to respond either with a fixed response or with a valid response chosen at random.

Internationalisation

The 1.5 Gateway works with Unicode documents. DIS will accept properly encoded ASCII, UTF-8 and Unicode documents.

Remote Monitoring

DIS provides for browser based monitoring of the length of the various document queues and the status of the service. This includes the ability to stop and start the service.

Automated Installation

DIS provides an MSI based InstallShield installation. This includes installation on all sized environments from individual machines to clustered environments.

Automated Test Tool

An automated test tool is also available which enables organisations to test their own systems working with DIS.

DIS Messaging Interfaces

DIS interfaces with Gateway through three distinct types of messages:

- **Business Forms** – these messages, initiated by a Gateway user who wishes to consume one of the organisation's services, are the primary message type handled by the DIS system. They constitute business documents sent to and from the Gateway and will be 'wrapped' in a GovTalk header during their journey through the Gateway
- **Admin Messages** – these are the messages such as address requests and responses, password changes etc, which generally affect user and agent information on the Gateway and back-end systems
- **Known Facts** – these documents are a special instance admin message for updating an organisation's service specific data held on the Gateway. Often of considerable size these can be dropped into DIS by FTP or received via HTTP

Business Forms Submission

This interface accepts an XML GovTalk format message containing business content to and from the Gateway over HTTP Post. Where required an organisation-specific transformation is applied to the message before passing it to the organisation's back-end systems and again before replying back out to the Gateway. An audit entry is made for each transaction. The following diagram shows a typical business submission as dealt with by DIS.
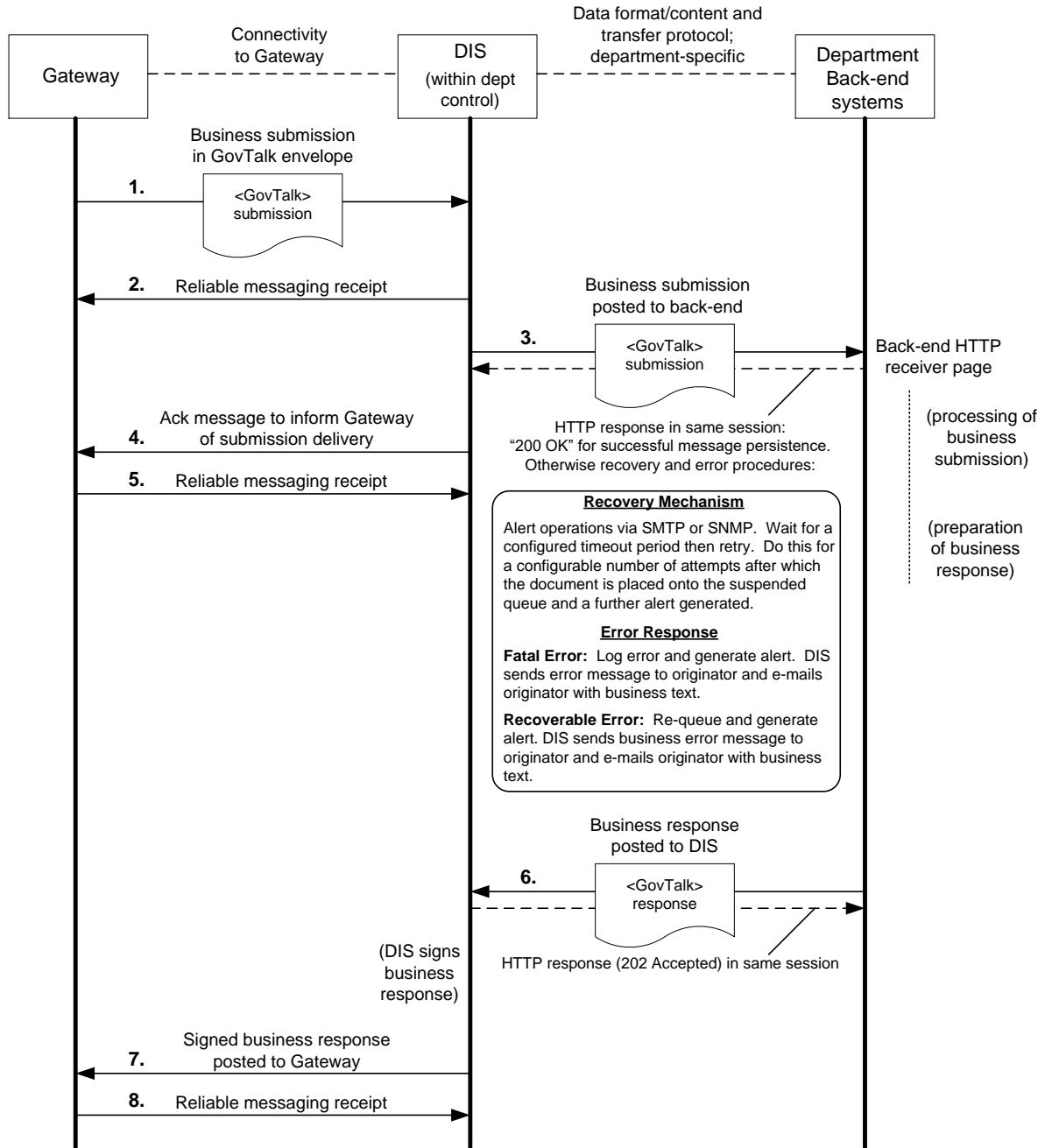
It should be noted that an organisation can respond to a DIS message either synchronously or asynchronously. Asynchronous communication is deemed to provide for the most scalable environment and is the scenario depicted above.

Admin Messages

To participate with the Gateway, organisations need to be able to process DIS-bound messages and generate Gateway-bound ones. The following table shows the generic messages used for the exchange of administrative information between the Gateway and the organisation's local servers. Note that all signing is optional. It can be done by a DIS on behalf of an organisation – in which case, an organisation's certificate is used, not a DIS certificate as such.

Admin Action [Associated Message Name]	Description	Message Path	Signed
Address Request [ADM-address-request]	Gateway request for a principal's postal address. Usually occurs at enrolment time to enable mailing of Gateway activation PIN	Gateway to DIS	No
Address Response	Response to the address request, containing	DIS to	by DIS

Admin Action [Associated Message Name]	Description	Message Path	Signed
[ADM-address-response]	the principal's address as known by the dept.	Gateway	
Enrolment Request [ADM-enrolment-request]	Message to request the automatic enrolment of a Gateway user to a service owned by that department.	DIS to Gateway	by DIS
De-Enrolment Request [ADM-deenrolment-request]	Message to request de-enrolment of a Gateway user from a department owned service.	DIS to Gateway	by DIS
Enrolment Notification [ADM-enrolment-notification]	Occurs when a principal activates their enrolment to a department service.	Gateway to DIS	No
De-Enrolment Notification [ADM-enrolment-notification]	Gateway notification of a completed de-enrolment of a user from a department service.	Gateway to DIS	No
Agent Rights Request [ADM-agent-rights-request]	Message to request the allocation of rights to an agent.	DIS to Gateway	by DIS
Agent De-Allocation Request [ADM-agent-rights-request]	Message to request de-allocation of rights from an agent.	DIS to Gateway	by DIS
Agent Rights Notification [ADM-agent-rights-notification]	Gateway notification of a completed allocation of rights to an agent.	Gateway to DIS	No
Agent De-Allocation Notification [ADM-agent-rights-notification]	Gateway notification of a completed de-allocation of rights from an agent.	Gateway to DIS	No
Change Keys [ADM-change-keys]	Inform the Gateway that a change of key identifiers for a company or individual must take place on the Gateway.	DIS to Gateway	by DIS
Change Password [ADM-change-password]	Inform the Gateway that a change of password for a company or individual must take place on the Gateway.	DIS to Gateway	by DIS
Known Facts Extracts [ADM-full-facts-DEPT-SERVICE] or [ADM-update-facts-DEPT-SERVICE]	Send known fact extracts, or a complete set, to the Gateway. DEPT and SERVICE are substituted for the particular department and service to which the known facts relate.	DIS to Gateway	by DIS

DIS to organisation messaging for Gateway-generated admin messages behaves in a similar manner to that of the business submissions shown above. Replies to this or generation of organisation originated admin message via DIS to Gateway are dealt with as follows.
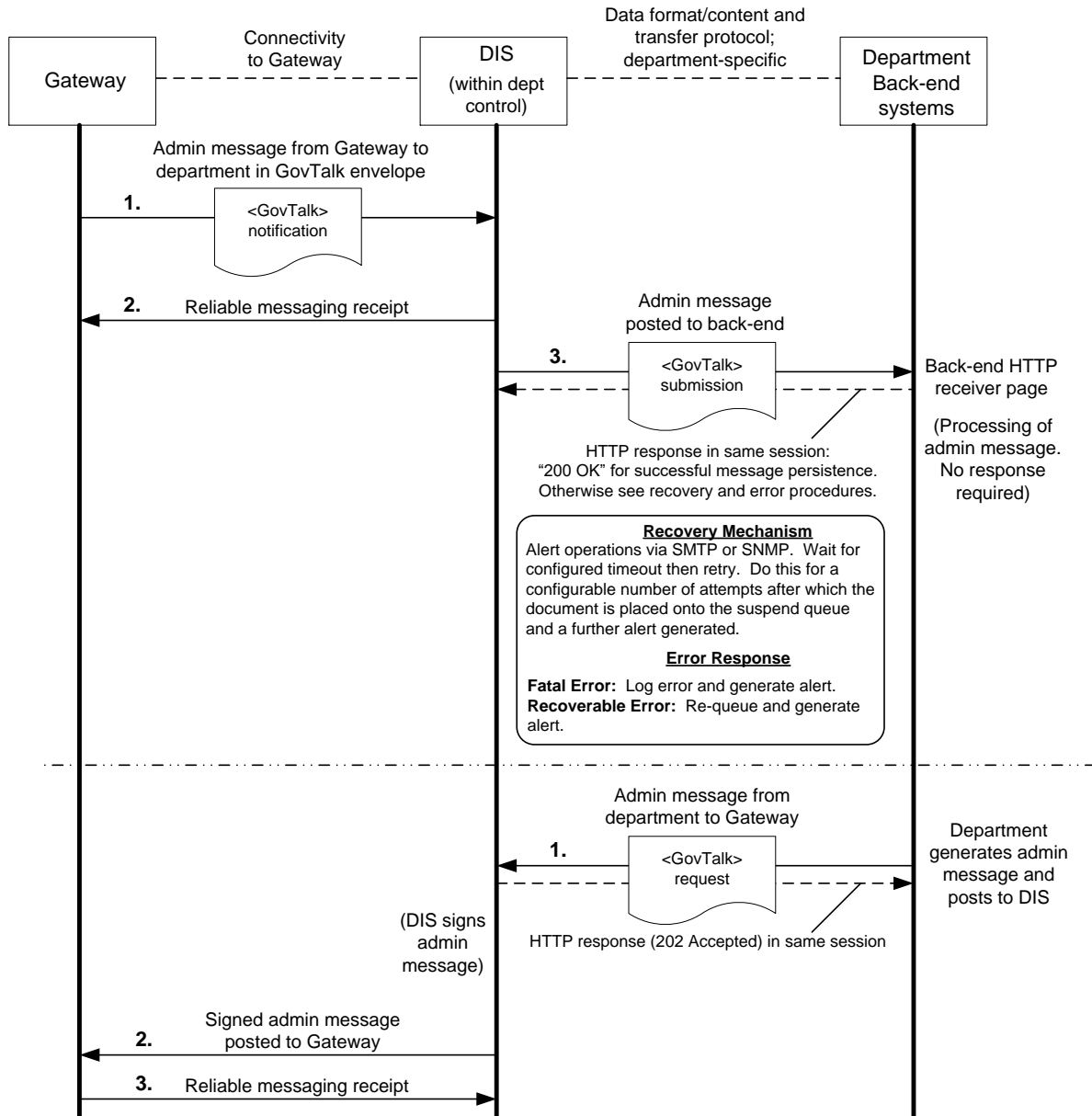
Known Facts

This process accepts a full-load or update known facts file from an organisation's back-end systems via, for example, FTP or HTTP Post. By default, the DIS will expect the organisation to have wrapped the known facts in a GovTalk envelope, but this process can be provided in DIS as a customisation. This transforms the raw file (often in CSV format) into Gateway-standard XML format and posts that, via HTTP, to the Gateway in the same manner as for other admin messages. An audit entry of this transaction is made by the DIS. Illustrations and examples of the correct wrapping of known facts can be found via the http://www.govtalk.gov.uk web site.

New DIS Features

With the 1.5 release of the Government Gateway, DIS has been enhanced with some new features, a summary of which is provided here. It should be noted that DIS 1.5 is backwardly compatible with the earlier Gateway release and will interoperate correctly in this environment. The following list duplicates information already contained in this paper but is intended to highlight those DIS 1.5 features that are new to organisations migrating from an existing Gateway DIS installation. These features are of course in addition to the existing DIS functionality that current Gateway users have today.

Provisioning

Organisations can configure the DIS, remotely if required, to change configuration or add new services. Some examples, but not exhaustive, of configuration changes available include: changing where documents are sent, changing organisational conversion formats, or adding entire new services. All this functionality is exposed via a correctly formatted XML document being sent to the DIS.

Remote Monitoring

Organisations can examine the length of the queues via a web browser and check the status of services. Services may also be securely start/stopped via this means.

Diagnostic Tracing

Substantial improvements include an increased use of the web log files and custom diagnostic files.

Improved Installation Process

DIS Installation and un-installation is much simpler, using an MSI-based InstallShield program. The installation program allows for a range of DIS installs from clusters to laptops. Clean un-installs are similarly provided for.

Integrated Test Tools

Organisations can use an automated test tool, not only to regression test the DIS, but also to help new sites verify that their back-ends can integrate correctly with the Gateway.

Improved performance & Bug Fixes

Ongoing improvements since the original Gateway go-live have been incorporated to ensure increased DIS reliability and performance. These include all operational fixes applied to date in addition to general code improvements and the movement of previously scripted code to COM binaries.

Internationalisation

DIS now supports documents in any language, including Japanese, Greek, Welsh etc.

Optional Document Validation

Optionally organisations can now validate incoming documents' format and size before they are accepted by the DIS box. Where applied, invalid documents are rejected back to the originator at the point the originator submits them.

GovTalk version Transformations

Optionally, DIS now provides organisations with translation between old and new GovTalk header formats as required either now or in the future.

Message Signing

As part of the Gateway's move to a fuller 'hub and spoke' model DIS 1.5 supports PKI signing of organisational messages. This greatly improves security by for instance, ensuring that only messages signed for by the owning and/or permitted organisation will be acted upon by the Gateway.

Further Information

More information is available from the Office of the e-Envoy web site (www.e-envoy.gov.uk). Departments requiring assistance in developing or launching Gateway-enabled services should send an email request to:

gatewayservices@cabinet-office.x.gsi.gov.uk

Queries from partners or developers, and comments about the site structure or content, of the Gateway Partnerlink site should be sent to:

gatewaypartnerlink@cabinet-office.x.gsi.gov.uk

Appendix A: Integration Adaptors

The following provides an indication of the wide range of technology and application integration adaptors. These are not provided as a standard part of DIS, but will assist organisations with the rapid integration of their existing systems with DIS and the Gateway where XML and HTTP are not already in use.

Application Adapter	Available Through
Ariba	iWay Microsoft RioLabs
Baan	Taviz
BroadVision	iWay
Clarus	Clarus Microsoft
Commerce One	iWay Microsoft RioLabs
Cove Systems	RioLabs
Covisint	iWay
CyBiz	CyBiz, Inc.
FrontStep	RioLabs
Great Plains	Great Plains RioLabs Taviz
Hogan Financials	iWay
i2 Technologies	iWay
Integral	iWay
J.D. Edwards	Actional iWay J.D. Edwards RioLabs Taviz
Kewill	Kewill
Lawson	Riolabs
Manhattan Associates	Manhattan Associates
McHugh	McHugh
Mega	Mega
Microsoft Excel	ItemField RioLabs Taviz
Microsoft Office XP	Microsoft
Microsoft Word	ItemField
Millenium	iWay
Navision	Navision
Onyx	Onyx

Oracle Financials	Compaq iWay RioLabs Taviz
Partner Community	Partner Community
Peoplesoft	Actional iWay Taviz
Pivotal	iWay Pivotal
QAD	RioLabs
Quickbooks	Taviz
Remedy	Partner Community
SAP	Actional Compaq iWay Microsoft RioLabs Taviz
Scala Business Systems	Scala Business Systems
Siebel	Actional Compaq iWay Siebel Taviz
Teamplate	Teamplate
Trade Power	RioLabs
Tuxedo	iWay
Ultimus	Ultimus
Vantive	iWay
Visibility	RioLabs
Walker Interactive	iWay
Worldtrak	Worldtrak

And the following technology adapters are available.

Technology Adapter	Available Through
Active X - Data Objects	Compaq
ADABAS	Attunity iWay
ADDS Regent 40	Pixel
ADDS Viewpoint	Pixel
ADM11/H	Pixel
ADM11/P	Pixel
ADM11/R	Pixel
ADM11/W	Pixel

AFP	ItemField
ALLBASE/SQL	Attunity iWay
ALL-IN-1	iWay
Ampex 230	Pixel
ANSI	iWay Pixel
APPC	Farabi
ASCII	ItemField iWay Taviz
AXIS Navigator HBOC	Pixel
BizTalk Framework	BizTalk Server Native Functionality
Btrieve	Attunity
Bull TP	iWay
C API	iWay RioLabs
CA-Datacom/DB	iWay
CA-IDMS	iWay
CA-Ingres	iWay
CICS / IMS	Attunity Actional Hostbridge iWay Microsoft Host Integration Server (HIS)
Cifer T205	Pixel
C-ISAM	Attunity iWay
Cloudbase	iWay
Cobol	Attunity ItemField iWay Taviz
COM	Attunity BizTalk Server Native Functionality Compaq iWay RioLabs
CORBA	Actional iWay
cXML	iWay
dBase	iWay
DB2 400	Attunity
DB2 6000	Attunity
DBMS	Attunity iWay

DEC VT100	Pixel
DEC VT220	Pixel
DEC VT320	Pixel
DEC VT420	Pixel
DEC VT520	Pixel
Deployment	Sagestone
DG 216	Pixel
DG5220 Meditech	Pixel
D-ISAM	Attunity
DL/1	iWay
DMS	iWay
Document Archival	rchive-it
EBCDIC	ItemField iWay Taviz
ebXML	iWay
EDI	BizTalk Server Native Functionality Covast Edifecs iWay RioLabs Taviz
ENSCRIBE	Attunity iWay
Essbase	iWay
FIX	ItemField iWay
Flat File	BizTalk Server Native Functionality
Focus	iWay
FTP	Farabi Syntrex Xceed
GALILEO	Pixel
Hazeltine 1500	Pixel
HIPAA	iWay Microsoft
HL7	ItemField NeoTool
HP 700/92/2392A	Pixel
HTML	ItemField
HTTP	BizTalk Server Native Functionality iWay
HTTPS	BizTalk Server Native Functionality
IBM 3101	Pixel

IBM 3151	Pixel
IBM 3161	Pixel
IBM 3270	Farabi iWay Pixel
IBM 3270E	Farabi Pixel
IBM 5250	Farabi iWay Pixel
IBM 5250E	Farabi
IBM DB2 UDB	Attunity iWay Taviz
IBM DB2/400	iWay RioLabs
IBM DB2/6000	iWay
ICL 7561	Pixel
ICL DRS-M10/M15	Pixel
IDMS	Attunity
IDS-II	iWay
IMAGE	Attunity
IMS	Attunity Microsoft Host Integration Server (HIS)
IMS/DC	Attunity iWay
IMS/TM	iWay
IN2 SM9400g	Pixel
IN2 SM9400j	Pixel
IND$FILE	Farabi
Infoman	iWay
Informix	Attunity iWay
Ingres	Attunity RioLabs
ISAM	Attunity iWay
J2EE	Actional iWay
Jasmine	Attunity
Java	Attunity Compaq iWay
Java Beans	Attunity iWay RioLabs

jBase	Attunity
JDBC	Compaq
JMS	iWay RioLabs
KSAM	iWay
Loopback	BizTalk Server Native Functionality
MDIS PRISM 8 / 9	Pixel
Microfusion MF-30	Pixel
Microsoft OLAP Services	iWay
Microsoft SQL Server 2000, 7	iWay RioLabs Taviz
MODEL 204	iWay
Monitoring	Xtremesoft
MQ Series	Actional iWay Microsoft (Adapter for MQ Series) Microsoft Host Integration Server (HIS) Taviz
MSMQ	BizTalk Server Native Functionality iWay RioLabs Taviz
Mumps	Attunity iWay
Net-ISAM	iWay
ODBC	Attunity iWay Taviz
OLE DB	Attunity
Omnidex	iWay
Oracle 7.x, 8.x	Attunity iWay Taviz
Oracle 8i, 7.3	Attunity RioLabs
Oracle 9i	Attunity
Oracle 9i & Advanced Queuing	iWay Taviz
P9 ANSI	Pixel
PACE	iWay
PC Monitor	Pixel
PDF	ItemField
Pick Systems	iWay
Progress 4GL/Database 8.3b, 9.0	iWay RioLabs

PT200	Pixel
QSAM	iWay
QUME QVT	Pixel
Rdb	Attunity iWay
Red Brick	Attunity iWay
RMS	Attunity iWay
RosettaNet	iWay Microsoft
RPG	iWay
SCO ANSI	Pixel
ShareBase	iWay
SIF	Microsoft
SMTP	BizTalk Server Native Functionality iWay
SOAP	Hostbridge
SQL/DS	iWay
SQL/MP NonStop	Attunity
SQL Server	Attunity
SUPRA	iWay
SWIFT	iWay
Sybase	Attunity iWay RioLabs
System 2000	iWay
Tandem NonStop	Attunity iWay
Tandem TS530	Pixel
Televideo 910	Pixel
Televideo 920	Pixel
Televideo 925	Pixel
Televideo 955	Pixel
Teradata	iWay
Texas Instruments TI924	Pixel
TIBCO ETX	iWay
TIBCO Rendezvous	iWay
Total	iWay
TurboIMAGE	iWay
UFAS	iWay

Ultrix/SQL	iWay
Unify	iWay
UX	iWay
Videotext	Pixel
VSAM	Attunity iWay
VT100+	iWay Pixel
VT220	iWay
VT340	Pixel
VT-UTF8	Pixel
WIIS	iWay
WYSE 50	Pixel
WYSE 50+	Pixel
WYSE 60	Pixel
XBRL	iWay
xCBL	iWay
XML	Actional Attunity BizTalk Server Native Functionality iWay RioLabs Taviz Web2XML