Using the SELEX Elsag Intelligent Information Dissemination (I2D) System over Fleet Broadband and BGAN

Bearer-agnostic data bandwidth reduction and management solution

Version 1.0

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1 Overview

The Intelligent Information Dissemination (I2D) software application from SELEX Elsag, a Finmeccanica company, is a bearer-agnostic data bandwidth reduction and management solution. It offers significant cost savings to Fleet Broadband users and enhanced capabilities to those operating low bandwidth communications systems, whilst automatically managing, assuring and auditing the dissemination of transferred information.

I2D offers a fully flexible data bandwidth reduction and management solution that is equally suited to both joint military operations and commercial applications, recently exercised over the Inmarsat BGAN and Fleet Broadband networks. I2D provides a middleware capability that seamlessly integrates with existing applications. It supports both satellite communications users and low bandwidth bearer users, whose operations depend upon the transfer and management of large volumes of information to multiple users spread across large networks.

2 Key Features

I2D Maximises data throughput, optimises bandwidth utilisation and ensures that the right information gets to the right place at the right time.

3 Typical Applications

Typical applications include:
Updating charts, maps and Office documents
Transfer of high fidelity imagery
Management, assurance, audit and reporting the dissemination of information around a network

The use of specialist compression techniques, including differencing engines and data management services enables I2D to optimise data and to automatically manage the transfer of information around any IP network and over any bearer in the most efficient manner, whilst ensuring that the right information gets to the right place at the right time.
4 Common Applications Overview

I2D provides a capability that is ideally suited to organisations that require to transfer and manage large amounts of data around any network and in the most economic way. I2D supports single product files and multiple files within a folder hierarchy. I2D has been in service within the UK MoD for over five years and has successfully provided a 90% Bandwidth reduction in the transfer and management of classified data files over the Fleet Broadband network.

The typical applications where I2D would provide significant cost, time and management savings are in the transfer of the following product types:-

- Classified Data
- Mapping
- Medical Records
- Situation Awareness Reports
- Office Documents
- Imaging
- Biometric data
- Sound files
- Binary data
- Publication Sets
- Websites
- Databases

5 Benefits to BGAN users

I2D provides benefits for anyone looking for:-

- reduction of data transfer costs
- transfer of large data files
- update to large data files (Office Documents, Maps, Charts, High definition imagery etc)
- automatically manage data dissemination
- assurance of data transfer
- scheduled transfer of data
### 6 Performance over BGAN and Fleet Broadband

Network tests were carried out by Inmarsat GMN over the BGAN Networks using the SELEX Elsag I2D application. The table below details of the tests and results.

#### 6.1 Imagery

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7 I2D Architecture

The I2D architecture consists of three components – hub, locations and clients. A central hub supports multiple locations which is extensible to as many locations as required.

Figure 1 I2D Architecture
7.1 I2D Hub

The I2D architecture employs the use of a single centralised Hub which contains the master database.

The hub is completely scaleable; from a single PC based solution for small networks to large systems comprising of a clustered database server and an extendable web farm.

7.2 I2D Locations

Location servers connect to the hub via high or low speed links (HF, PRRs etc).
Location servers can support two way or one way links.
A location server also supports full client functionality.
A location server can support any number of clients.
I2D software is installed on a location server, using a SQL Server Express database.
I2D provides an API web service on a location server to allow access to I2D services.

7.3 I2D Clients

Clients connect to a location server.
Suppliers and consumers access to I2D is via web interfaces, therefore there is no installation of software required on a client.
Information planners and administrators require an I2D application to be installed on the client in order to access appropriate I2D functionality.
Clients may use any web browser on any platform to operate I2D.
Clients may be desktop PCs, or mobile devices such as PDAs and Blackberry phones.

7.4 Ease of use

I2D is designed to be easy to use and work as an open standard.

Web Browser

As a browser based application I2D is designed to provide an easy to use interface that requires very little operator training before the benefits of the capability are realised.

Windows Explorer

I2D also offers a standard Windows explorer interface via the use of the 'I2D drop folders' capability. Users are able to set up directories (folders) to act as portals for the transmission and reception of data enabling the user to drop files into and read files from these directories offer a simply interface with I2D via Windows Explorer.
8 Setting up

8.1 Getting started

I2D is an application that will run on Windows XP and Windows 7 computers and will need to be installed on all computers aiming to benefit from the application. I2D can be set-up to run in the background so from the end-user point of view files are just moved to a ‘drop folder’ in Windows explorer where they are then compressed and transmitted to predefined recipients.

8.2 Set-up

To start using the I2D application:

First, activate a BGAN or FB Standard IP connection through your terminal. If you are using a Thrane & Thrane terminal I2D doesn’t require you to set-up port forwarding.

Once a Standard IP connection is established the I2D application will automatically connect to the Central Hub and be authenticated. Once this happens you will need to run the I2D Drop Folder application, this will create a small icon in the taskbar (far left) and when you hover over it you will see the below message when ready.

![Figure 2 Task Bar Icon](image)

I2D is now ready to monitor the predefined folders. If you double click the icon in the taskbar it will open a window as below. In this example we have created a drop folder at C:\Dropfolders. Everything placed in this folder will be compressed and transmitted across the Standard IP connection. And be delivered to the Central Hub predefined recipients.

![Figure 3 I2D Drop Folder Log](image)
Once the files have been transmitted the application will continue to stay online and monitor any incoming files until the application is closed.

9 Key Feature Details

9.1 Information Management

I2D provides information management functionality in the following areas:-
- Management of users and locations
- Management of supplier and consumer data access
- Management of platform definition

I2D is a role based application which determines what functionality a user is allowed to perform.

An information management plan can be produced so that users only see products that they can supply, and only products that they can access.

The information management functionality is fully flexible allowing users to create simple or complex information management structures.

The information management plan produced is not only used to determine what users can and cannot see, but also by the I2D application itself to determine where products are distributed to, ensuring that locations that do not require the product do not have the product delivered.

9.2 Security/DATA PROTECTION

I2D has the capability to attach protective markings and caveats to products and users.

Products that have a higher security labelling than the user are not visible. This facility works in tandem with the information management plan.

I2D conforms to MOD security standard JSP440.

9.3 Bandwidth Optimisation

At each location, the amount of bandwidth available to I2D can be controlled by the user to allow for traffic with a higher priority to use a majority of the bandwidth.

Use of deployed I2D systems has seen network traffic decrease by up to 90%.

I2D uses differencing to ensure that only changes between products are sent.

I2D uses compression algorithms to transfer images efficiently, ensuring that good image quality is maintained.
Due to the way I2D was designed using a plug-in architecture, future algorithms can be easily added to the I2D application.

![I2D Image Compression](image)

**Figure 4** I2D Image Compression

## 9.4 Delivery

I2D allows consumers to select which products they want to download.

I2D allows suppliers to push products to locations. The information management plan determines the locations to push the products to.

Each location has its own schedule which can be fully maintained. Figure 5 below shows an example of an I2D schedule; this screen details the reception queue and the progress of the file transfer.

![I2D Scheduler](image)

**Figure 5** I2D Scheduler
I2D will deliver single files of any data type, a set of files of any data type, and a directory structure of files of any data type.

I2D performs full data integrity checking on all transfers whether they are from a supplier, or to a consumer.

I2D allows consumers to load products onto their location from outside of I2D, for example from a DVD. This allows locations to be pre-populated if required.

Where locations only have one way links to the hub, locations act as broadcast sites where products are automatically received.

9.5 Low Bandwidth Support

A standard location connects to the hub usually with a link of 64kbps or more. This mechanism uses standard web protocols for communication (HTTP and HTTPS).

I2D has been designed so that different protocols can be used, especially within a low bandwidth environment. This is due to the plug-in architecture used by I2D.

I2D has been successfully tested down to bandwidths of 1.2kbps.

Successful tests have been carried over HF and STANAG 5066.

I2D has been tested using Personal Role Radios and Soldier System Radios.

9.6 I2D Product Compatibility

I2D supports single product files and multiple files within a folder hierarchy.

I2D has been tested with the following product types:

- Classified Data
- Mapping
- Medical Records
- Situation Awareness Reports
- Office Documents
- Imaging
- Biometric data
- Sound files
- Binary data
- Publication Sets
- Websites
- Databases

A single product file may be viewed directly from the Web application, the example below shows an image file that has been delivered and then viewed using the I2D Web interface.
9.7 Reporting

I2D provides the capability to report on all data held.
I2D provides a standard set of reports for analysis of:
- The information management plan.
- I2D usage including products being uploaded and downloaded.
- Access to I2D from users and locations.
Reports can be saved in XML and CSV formats so that they can be imported into 3rd party applications.

9.8 Traceability, Logging and Notifications

I2D provides full logging and audit trails of everything that has happened on the system.
This information is stored at the central hub but may be accessed from any location using the I2D Reporting functionality.
I2D provides the capability for consumers to log the exploitation of their products.
I2D provides the capability for all users to log observations and update them until they are resolved.
I2D sends out notifications to users for events. These notifications can be accessed from the web application allowing the user to read and delete them at their leisure.
I2D event notifications can also be sent to users via any existing email infrastructure.
I2D provides an API so that 3rd party applications can integrate with the I2D system. The API provides support for the following functionality:

- Logging in and out
- Accessing product information
- Product creation, publication, delivery and export
- Schedule maintenance
- Logging
- Report generation

The API has been used by companies such as SELEX Galileo, HP Labs and General Dynamics.

9.10 Drop Folders

I2D can monitor folders and automatically publish files that are dropped into them. This means that I2D can be integrated with other applications without the need to change any code in the 3rd party application.
10 Further support and Information

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