



Best practice for SwiftBroadband

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Contents

1	Introduction	1
1.1	About this guide	1
1.2	Terminology	1
1.3	Other sources of information	1
2	Applications	2
3	IP Optimisation and tips	3
3.1	TCP PEP	3
4	Improving email performance	4
4.1	Optimising Outlook Express	4
4.2	Optimising Eudora 5.1	5
4.3	Optimising Mozilla Thunderbird	5
5	Optimising Email clients	6
5.1	General principles	6
5.2	Compression	6
5.3	Using specialised software solutions	6

1 Introduction

1.1 About this guide

This document explains how to achieve the best performance at the lowest cost with SwiftBroadband.

It is intended for distribution partners, service providers and anyone who wants to use a SwiftBroadband terminal to connect to the Inmarsat Network and use network services. A previous knowledge of satellite communications and avionics is useful, but not essential.

This document covers the following topics:

- Applications – Recommended SwiftBroadband services which can be used for each on board solution
- IP Optimisation and tips – Optimisations which can be done to user machines and set-up, regardless of applications in use
- Improving email performance – Applying tweaks to selected email clients to achieve the best performance

1.2 Terminology

The following terms are used in this document. A brief explanation of each is given.

- PDP context – A Packet Data Protocol (PDP) context transfers information about your data connections between the SwiftBroadband terminal and the Inmarsat Network. The PDP context defines connection aspects such as routing, QoS and security. The SwiftBroadband terminal opens a primary PDP context or a secondary PDP context, depending on the IP data connection type. Refer to SwiftBroadband and PDP contexts for details.

1.3 Other sources of information

- This is one of a series of PDF documents that make up the SwiftBroadband Solutions Guide. The Solutions Guide is designed to help you make the most of your SwiftBroadband terminal. Other documents in the series are available for download from www.inmarsat.com/support. Click on *SwiftBroadband* to view a list of the available user guides.

2 Applications

Whilst the optimisation to the underlying IP protocols is explained within the IP optimisation and tips section – the most scope for improving SwiftBroadband performance is with the intelligent selection or development of dedicated applications which eliminate the need for third party software with its unnecessary bandwidth overhead.

Users can maximise their throughput and lower cost by selecting a SwiftBroadband service which suits the application being used.

The table below gives the most common solutions for SwiftBroadband and the recommended SwiftBroadband service:

Solution	Description	SwiftBroadband Service
Email	The standard IP service is ideal for sending and receiving emails	Standard IP
Internet access	The standard IP service is best suited for internet browsing.	Standard IP
VPN	Standard IP is suitable for VPN connections.	Standard IP
FTP	SwiftBroadband is also optimised for sending and receive files using FTP using the background IP.	Standard IP
Voice / VoIP	Voice calls can be made over the native Voice service in SwiftBroadband or as a Voice over IP.	AMBE 2 (4kbps) / Standard IP
Fax	Fax can be sent using either the voice service in SwiftBroadband or using a fax over IP solution.	Voice 3.1KHz
Videoconferencing	SwiftBroadband is suitable for use with most video conference equipment that can use an IP connection.	Streaming IP- 64 / 128
IFE integration	SwiftBroadband can be used as the communication link between the head end of an IFE system and the ground.	Standard IP / Streaming IP- 32
GSM	This solution will allow passengers to use their own devices to make phone calls	Streaming IP- 32 or lower
GPRS	This solution will allow passengers to use their own devices to send text messages, GPRS packet data and emails.	Standard IP

Overall user experience can be further improved by disabling optional Auto-updates for various virus scanners and operating systems. These updates are usually not mandatory and use bandwidth which is charged and can be used more optimally for other applications.

3 IP Optimisation and tips

- Make sure that end-to-end QoS is supported for the required data rate.

This is particularly important for UDP-based applications running over Streaming IP connections on SwiftBroadband. To maintain throughput and quality it is important that QoS is maintained across the terrestrial 'last mile' link as well as the satellite interface.

If you want to use SwiftBroadband for live video and audio streaming traffic using UDP-based applications, Inmarsat recommends that you investigate and implement 'last mile' routing arrangements which guarantee end-to-end QoS. Your SwiftBroadband service provider can provide details of available interconnect options.

- Turn error correction off. Error correction is not required by either protocol, because:
 - UDP does not require re-transmission.
 - TCP has re-transmission built-in.

3.1 TCP PEP

TCP PEP (TCP Performance Enhancing Proxy) is an optimisation which has been tested and is proven to improve performance over the SwiftBroadband network. TCP PEP software, provided by Inmarsat and working on the Inmarsat network, boosts the upload speed of all TCP traffic by up to 300% (depending on file size), with an average increase across all applications of 70%.

This modification is of particular benefit for applications which send short bursts of data over the network such as internet browsing and email.

TCP PEP adjustments include modifying TCP window settings by changing the window size to allow a larger amount of data to be carried at any point in time over the network and, negating the TCP slow start behaviour which is further deteriorated by the Round Trip Time between the aircraft, satellite and ground segment.

There are three types of TCP PEP solutions available from Inmarsat for use over its network. These include:

- TCP PEP Client: Client application which is installed in the terminal or attached server. The client application optimises the flow of data in the reverse direction from the SwiftBroadband terminal to the satellite through to the ground segment.
- TCP PEP Network: Server based application for non-VPN users. This sits within the Inmarsat network and together with TCP PEP client enhances performance in the receive/download direction.
- TCP PEP VPN Enterprise: A server based application for VPN users. This sits within the Enterprise site and together with TCP PEP Client enhances performance in the receive/download direction

The Inmarsat TCP PEP application (TCP Accelerator) is recommended for download, if not installed in the terminal or server, free from the Inmarsat website and has been extensively tested for use over the Inmarsat network.

It is possible that SwiftBroadband-ready terminals are developed and supplied with the optimisation implemented from the factory.

The client application can be downloaded and installed on Windows and MAC based operating systems from: http://www.inmarsat.com/Support/BGAN/TCP_accelerator.aspx

4 Improving email performance

In general, the SMTP, POP and IMAP protocols do not offer compression, although IMAP4 allows retrieval of headers only.

The most effective method of optimising email clients over these protocols is to reduce the amount of data that is sent and received. This also applies to proprietary protocols. The following hints and tips are generic and apply to all protocols and clients. The rest of this section concentrates on optimising some of the most commonly used clients:

- Use IMAP servers rather than POP3 servers and enable the viewing of message headers rather than downloading all messages.
- Disable regular automated checks for new mail to reduce traffic.
- Disable the download of messages whilst they are being previewed to reduce traffic.
- Ensure that messages are sent as text, rather than as HTML, to reduce message size. An HTML message can be up to twice the size of a text message.
- Disable signatures to reduce message size.
- Disable read receipts to reduce traffic.
- Compress attachments to reduce message size. (Also, consider converting attachments to text files, to reduce message size.)
- Enable connection selection on start up, that is you are asked if you are online or not.
- Enable offline use, so that message delivery is controlled rather than happens in the background.

4.1 Optimising Outlook Express

Outlook Express supports both POP3 and IMAP4 protocols. Neither of these protocols provides any compression of data over a communications link. You can optimise the performance of these protocols, as follows:

- Switch off *Check for mail every x minutes* option, or set the value to several hours. Checking for mail when there isn't any generates up to 6KB of traffic. By checking for email only when necessary, you can reduce costs.
- Switch off *Send and Receive messages* at startup. This allows queuing or sending of batches of mail.
- Disable Automatic download of messages when in the viewing pane. This stops messages being downloaded as you browse the headers.
- Send plain text messages only. If you use bold, underline and non-standard fonts more data is used than plain text.
- De-select the *Send messages immediately* option. You can queue messages enabling them to be sent all at once rather than initiate a connection for each message.
- Do not include the original message in your reply. This reduces the amount of data sent.
- Do not include read receipts. Read receipts are designed to allow the sender of the message to be notified when the recipient has opened the message. As this generates extra traffic, Inmarsat recommends that you switch them off.

TIP: IMAP4 transmits email twice. The email is first sent to the SMTP server and then to the IMAP server, to be placed in the "Sent Items" folder. You can turn this feature off by unchecking the "Save copy of sent messages in the 'Sent Items' folder" check box.

TIP: Outlook over IMAP4 allows the client to synchronise selected folders to the local machine. This feature is controlled on the window shown when the IMAP account is selected from the left hand panel. Turn synchronisation off for all folders to avoid unnecessary downloads.

4.2 Optimising Eudora 5.1

Eudora 5.1 supports both POP3 and IMAP4 protocols. Neither of these protocols provide any compression of data over the communications link. You can optimise the performance of these protocols, as follows:

- Download part of a message (over POP3). This has the benefit of appearing to download only the header (if set correctly), and of giving you the option of deleting a message that may contain a virus without downloading it. You are prompted to skip messages over a certain size; Inmarsat recommends that you skip messages over 3K.

NOTE: Although this setting suggests that you are skipping messages over a specified size, in fact the program skips the remainder of the message after the first 3K has been downloaded.

- Leave email on the server. This has the advantage of enabling you to retrieve the message later, or downloading a duplicate copy if you lose the original. The disadvantage is that you could download a duplicate copy of an existing message. Inmarsat recommends that you download what is required, and delete what is not from the server.
- Send plain text messages only. If you use bold, underline and non-standard fonts more data is used than plain text.
- Do not include signatures. Signatures impose an extra overhead.
- Send messages together. This allows email to queue, which reduces the number of SMTP connections needed to send messages.
- Check for mail manually (or set the automatic check function to check every few hours). Checking for email only when necessary can reduce costs.
- Do not enable read receipts. Read receipts are designed to allow the sender of the message to be notified when the recipient has opened the message. This generates extra traffic. Read receipts are disabled in Eudora by default.

4.3 Optimising Mozilla Thunderbird

The Thunderbird client is an open source equivalent to Outlook Express. Exactly the same modifications can be carried out to ensure that this client works optimally over SwiftBroadband.

- Switch off Check for mail every x minutes option, or set the value to several hours. Checking for mail when there isn't any generates around 6KB of traffic. By checking for email only when necessary, you can reduce costs.
- Switch off Send and Receive messages at startup. This allows queuing or sending of batches of mail.

TIP: IMAP4 transmits email twice. The email is first sent to the SMTP server and then to the IMAP server, to be placed in the "Sent Items" folder. You can turn this feature off by unchecking the "Save copy of sent messages in the 'Sent Items' folder" check box.

- Send plain text messages only. If you use bold, underline and non-standard fonts more data is used than plain text.
- Unless you want your messages available offline, disable offline downloads. Uncheck the Make the messages... and When I create new... check boxes.
- Disable some of the advanced options for extra bandwidth savings. Uncheck Block loading of remote images, and disable the return receipts option.

5 Optimising Email clients

Some distribution partners (DP) provide dedicated email facilities, which are configured to work more effectively over a satellite link, and therefore improve on those provided by an ISP. Also, as the DP hosts the service, the traffic does not pass over the internet. This provides extra resilience and performance improvements.

5.1 General principles

Inmarsat recommends that you use a standard TCP/IP data connection for email. The Standard IP data connection opens by default when you register with the network and is sufficient for most email requirements.

5.2 Compression

The most cost-effective way to send large attachments over a packet network that is billed by volume or time is to compress the file with a standard utility such as:

- WINZIPTM, available from <http://www.winzip.com/> or
- WinRAR, available from <http://www.rarlab.com/>.

You can then FTP the file to a designated FTP server and alert the recipient by email to retrieve the file locally. Many email clients when sending such attachments via SMTP will add greatly to the attachment's original size, sometimes by as much as 50%. Compressing attachments is only of benefit if the content is not already compressed, and the recipient has a utility to de-compress the attachments.

Contact your DP for advice.

5.3 Using specialised software solutions

The performance of an email service can be further improved by employing specialised software, such as SkyFile and Rydex. This software offers some of the following potential benefits:

Extra resilience

If a data link is broken during the transmission of messages, standard software will re-start the transmission from the beginning. Specialised software is able to continue this transmission from the point it stopped.

Message filtering

Specialised software enables you screen email before it is downloaded. You can use this simply to prevent large messages from being downloaded, or you may be able to check who is sending messages and only allow messages through from known sources.

Least-cost access

It may be possible to save on costs by choosing a different class of connection, based on the volume and frequency of email transactions. For example, a connection charged by time may be cheaper than a connection charged by volume for larger volume email transactions. In addition, specialised software can provide the ability to automatically select the cheapest network.

Batching and compression

Specialised services can provide automated batching and compression matched to the tariff structure, ensuring that messages are transmitted in the most cost effective way.

Specialised email message hubs

There are several companies that provide email services specifically for wireless networks. The features and benefits of these solutions match those of DP value-added services. It is also possible to purchase hubs that can be sited at corporate headquarters in order to provide access for remote users directly into corporate systems, rather than routing through a third party.

Email middleware

Middleware is a term used for software that provides a link or bridge between two applications or environments. Rather than develop complete messaging hub solutions for satellite systems, some specialist companies have developed components that integrate with the popular corporate systems. These solutions allow closer integration with existing corporate messaging systems, whilst still providing features that benefit the remote user.