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Welcome,

Welcome to Case Communications October Newsletter. This month we announce that we have moved to new and larger offices, we look at Microsoft breaking their promise on IE 8, and look at some aspects of the economic downturn.

Case Communications expand their operation and move to new offices

Case Communications move to new larger offices, 3 miles away from their old offices.

[More]

Microsoft breaks its IE 8 promise in under 6 months

In March, Microsoft announced that their upcoming Internet Explorer 8 would: 'Use its most standards compliant mode, IE8 Standards , as the default.

During September 2008, the promise was broken. It lasted less than six months.

[More]

BSG publishes costs of deploying fibre based superfast broadband

The Broadband Stakeholder Group (BSG) – the government's advisory group
on broadband – publishes   report on the costs of deploying
fibre based next generation broadband in the UK

[More]

The Queen Visits Google

The Queen joined the Web 2.0 generation today when she uploaded a clip to YouTube for the first time.
[More]

BT trying to sell its secret underground tunnels.

BT is looking for a new buyer for its "secret World War II tunnels".

[More]

Fighting the credit crunch

In the space of six months the term "credit crunch" has become a media buzzword. It means a shortage of liquidity (or hard cash) leading to an unwillingness on the part of financial institutions to lend money.
[More]

The economic downturn could be good news for some in the IT Industry

According to consulting company Frost and Sullivan the economic downturn is not universally bad news for IT, and they say gloomy markets can actually mean good news for certain segments of the tech industry.
[More]

Job security is on the mind for IT contratcors

Long-term unemployment is on the up for UK IT contractors and job security fears are increasingly on their minds.
[More]

An Overview of FTP

This month Case Developer Mathew Royal takes a look at the File transfer FTP.
[More]

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Case Communications expand their operation and move to new offices

After seven years in the same offices Case Communicaitons have moved to new larger premises just 3 miles away from their old offices.

At the same time our logo has been changed slightly to modernise it, a copy of the new Logo can be seen at the bototm of this article.

Unfortunately the new location was just far enough away to mean the new offices are on a different telephone exchange to the old offices so new telephones numbers were required.

The address of the new offices can be found on the Case Communications Web site and is also displayed below;

Our new address is

Case Communications
Unit 12E
North's Estate
Old Oxford Road
Piddington
High Wycombe
Bucks HP14 3BE

Telephone 0845 643 0800

Int +44 (0) 01494 880 240

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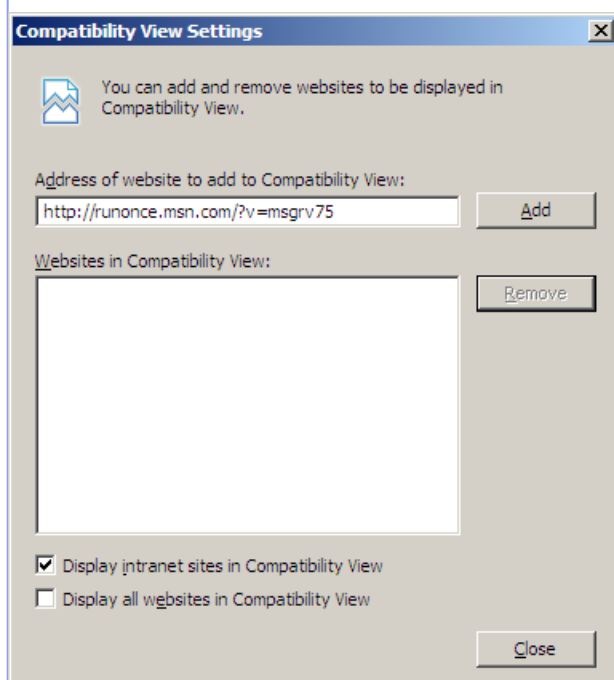
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Microsoft breaks its IE 8 promise in under 6 months

Now that Internet Explorer IE8 beta 2 is released, we know that many, if not most, pages viewed in IE8 will not be shown in standards mode by default. The dirty secret is buried deep down in the «Compatibility view» configuration panel, where the «Display intranet sites in Compatibility View» box is checked by default. Thus, by default, intranet pages are not viewed in standards mode.

How many pages are affected by this change? Here's the back of my envelope: The PC market can be split into two segments — the enterprise market and the home market. The enterprise market accounts for around 60 per cent of all PCs sold, while the home market accounts for the remaining 40 per cent. Within enterprises, intranets are used for all sorts of things and account for, perhaps, 80 per cent of all page views. Thus, intranets account for about half of all page views on PCs!

Furthermore, web standards are discriminated against in IE8 by the icon that appears next to standards-compliant web pages:

The picture shows a broken page. A broken page? Why is broken page icon shown next to standards-compliant pages? The idea, apparently, is to encourage users to escape standards-mode by clicking on the broken page. There's a dastardly logic here: showing a broken page may make users wonder if they are seeing pages correctly. Authors are probably not too thrilled by having a broken

page shown next to their pages, and the only way to avoid the icon is to not trigger standards mode. The message is clear: don't use standards!

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BSG publishes costs of deploying fibre based superfast broadband

The report, produced by Analysys Mason for the BSG, sets out the costs of the various technology options in detail and explains how those costs mount up as fibre is pushed out across the country. It suggests that rolling out fibre nationwide would cost between £5.1bn and £28.8bn (depending on the technology used) and that the costs of deploying in rural areas will far exceed the costs in urban areas.

"This is the most comprehensive analysis produced to date on the costs of deploying fibre in the UK", said Antony Walker Chief Executive of the BSG. "The scale of the costs looks daunting but the report does shed light on how some of these costs can be reduced and what the likely extent of commercial rollout will be. It should focus minds of commercial players, policy makers and regulators on the potential solutions to these challenges."

The model demonstrates that national deployment of fibre to the cabinet (the cheapest technology option) would cost £5.1bn – this is three or four times more than the telecoms sector spent deploying today's broadband services. Taking fibre to every UK home (using point to point fibre – the most expensive technology option) would cost as much as £28.8 bn.

The largest single cost component is the civil infrastructure (the cost of deploying and installing the fibre in new or existing ducts). The report suggests that these high civil infrastructure costs could be significantly reduced by the re-use of existing telecommunications ducts; the sharing of alternative infrastructure owned by other utilities, such as water companies; and the use of overhead fibre distribution in some areas.

The report also suggests that deployment costs will be relatively constant across higher density areas. This implies that, if a commercial case for deployment exists, the market should be able to deliver to approximately two thirds of the UK population. However, the costs of deploying in more sparsely populated areas will be significantly higher, making the commercial deployment to the last third of UK households much more difficult. "If rural areas are to be served in a reasonable time frame, thinking needs to start now about creative solutions for making them more attractive to investment", said Walker.

The BSG's earlier research on public sector interventions (www. broadbanduk.org/psi) showed that there are many models for how this can be done that stop far short of large-scale subsidy, but do require the private sector to work closely with public bodies and local communities. In particular, demand stimulation initiatives, such as pre-registration schemes, localised to the level of individual streets or cabinets could prove highly effective in extending the reach of these networks.

Each technology has a high proportion of fixed costs that are incurred regardless of how many users take the service. This means that the cost per home connected (and therefore the commercial viability of the service) is highly dependent on the level of take-up. "If operators could achieve a higher than expected level of take-up in rural areas, then

the business case for deployment in those areas could improve significantly", said Walker.

"The magnitude of the costs, and how the costs differ between urban and rural areas, will be important for operators, media players and public sector organisations looking to develop their future broadband strategies" said Matt Yardley, Partner at Analysys Mason, who directed the work

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The Queen Visits Google

.The monarch took the leap into the wired world as she and her husband, the Duke of Edinburgh, were shown around Google's London HQ, which is down the road from Buckingham Palace.

The Queen, who admitted she did not even own a computer four years ago, joined the ranks of teenage narcissists worldwide by posting her YouTube video, a 1969 reception for British Olympians to The Royal Channel.

Her whirlwind induction continued with a face-to-face meeting with the less than regally named daveyboyz, aka David Bass, and other UK YouTube superstars Peter Oakley and Lauren Luke.

The Royal Channel launched in December 2007 and received more than one million channel views in its first week, making it one of the fastest growing channels of all time.

Photo credit: Google

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BT trying to sell its secret underground tunnels.

The mile-long Kingsway Tunnels have a chequered history, starting off life in the early 1940s as air raid shelter designed to hold 8,000 people and later briefly taken over by MI6 for storage.

The tunnels, which run 100 feet underground below Holborn, in London, also played home to 400 tonnes of sensitive documents from the Public Records Office in 1945 and were later transferred to the Post Office and then onto BT in 1984 when the telco was privatised.

BT used the tunnels as trunk exchange, connecting long distance calls before the STD (subscriber trunk dialling) code was introduced. According to the telco, the exchange routed the hotline between the US President and his Russian counterpart in the 1950s.

In the 1980s, the tunnels were the base for BT's data back-up services and also the telco's London Area Group.

Some 25 years after first taking over the tunnels, BT is now hoping to find a new owner for them.

A BT spokesman said the tunnels have been unused for some 15 to 20 years, with the decision to sell them prompted by Griff Rhys Jones.

The spokesman said: "It was that Griff Rhys Jones show where he goes around New York, London, Paris looking at old buildings. Last week he was in New York, yesterday he was in London. They approached us earlier on in the year and said 'Can we have a look around your tunnels?' and we said 'yes, we're trying to sell them'."

The telco reckons a government body or large company might prove a likely buyer. According to the spokesman, no offers on the tunnels have been received yet.

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Fighting the credit crunch

There is certainly no shortage of extraordinary events to grab the headlines in the financial press. In the UK, the Northern Rock bank was rescued with a public sector bail-out of between £50bn and £100bn (depending on which estimates you care to believe). Other European lenders have similarly overstretched themselves. The German state-controlled IKB Deutsche Industrie Bank has received over €7bn of state and private funding to remain afloat.

The IT industry angle

The phenomenal growth of e-commerce has revolutionised sectors like the travel industry. Digging deeper, manufacturers have used supply chain IT to support just-in-time and lean manufacturing processes. Specialist software has made the lives of HR and finance professionals easier and more productive.

The next five years could well be characterised by a new trend in IT investment: the conversion of these essential major projects wherever possible from capital expenditures into operating expenditures. There are two key examples of this happening already.

The first is the evolution of rented services (variously known also as Software Plus Service for Microsoft products, or Software-as-a Service). Microsoft's Exchange e-mail servers, for example, can now be delivered online on a rental basis, entirely removing the upfront capital expenditure required to switch the service on.

The second is the growth of specialist IT financing, which spreads the cost of an IT investment (software, equipment and support services) across a defined period. Financing makes perfect sense for companies looking to make major IT investments, as payments can be structured to:

- smooth over the upfront costs
- ensure predictable and regular cashflow
- match the expected lifecycle of the equipment and services used.

Microsoft Financing: spreading the load

These benefits would of course apply to bank sourced financing, but in a credit scarce economy, bank financing may either be simply unavailable, or available only at punitive interest rates and after a painful amount of legwork and documentation. However, with the support of an expert partner network to ensure that these investments deliver real business benefits, Microsoft Financing structures loan/ lease deals which are unsecured and require no guarantees.

Microsoft Financing comes at a very reasonable cost, and above all it's very simple to set up. Because software, hardware and associated products can all be financed in one deal even including non-Microsoft products, the buying process is simplified incredibly."

Ovum analyst David Mitchell says "Many organisations are keen to use vendor financing over traditional bank financing. For more mature organisations, it's a source of treasury diversity - they have other lines

of credit but vendor financing serves to diversify their risk profile. For others, particularly in the midmarket, being able to vendor-finance is easier and less fuss than going through the bank circuit."

Ovum's own research shows that for transaction sizes above £25,000, over 80% of organisations would consider some sort of financing. But interestingly, vendor financing (as a subset of available financing routes) is most popular in the £25,000-£50,000 investment range precisely the sort of IT expenditure sought by the midmarket businesses most likely to be hit by the credit crunch. For these companies, vendor financing is simpler to obtain, and comes with the added benefit of a clear roadmap to ROI.

Even small businesses can benefit from financing. Indeed smaller ventures, with no access to the diverse range of financing options on offer above £10m of turnover, stand to lose most from credit starvation. Ovum's survey shows that 89% of businesses seeking IT funding of under £25,000 would still consider vendor-financing as a way to sidestep straitened banking conditions and ease cashflow.

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The economic downturn could be good news for some in the IT Industry

According to consulting company Frost and Sullivan the economic downturn is not universally bad news for IT, and they say gloomy markets can actually mean good news for certain segments of the tech industry.

As economic uncertainty deepens there is renewed business focus on cost-cutting which can be a boon to IT, according to Andrew Milroy, ICT director at Frost & Sullivan. He identified four technologies and service areas likely to experience increased demand in the current climate: sustainable IT; outsourcing services, managed and hosted services; information management tools; and services that support mergers and acquisitions.

In a report called *ICT Opportunities in an Economic Downturn*, Frost & Sullivan predicts belt-tightening will increase investment in sustainable technology initiatives - such as virtualisation, videoconferencing, thin clients and power consumption modelling - as they are able to lower costs as well as boost green credentials.

It said a recent survey of organisations in Australia indicated 90 per cent have or are in the process of introducing sustainability initiatives within their ICT infrastructure.

The consultancy also predicts good times ahead for software as a service (SaaS) as it says tighter controls and a desire to minimise risks will increase focus on variable costs - leading to greater interest in SaaS and hosted service models.

Other areas that could potentially do well in a downturn are transactions via mobile phones, electronic billing services and self-service systems such as branchless banking, according to the consultancy, along with traditional and non-traditional areas of managed services such as managed handsets, network services and leasing services.

Milroy said in a statement: "In particular, ICT solutions that shift costs from a capital to variable component, focus on productivity increases and cost reduction, and support organisational restructuring and acquisitions are likely to see growing demand."

Frost & Sullivan also believes demand for IT outsourcing will ramp up but says offshore organisations are likely to reap the biggest benefit as they can be most competitive on costs. Contract terms for deals, however, will probably fall significantly.

Other areas that could do well include CRM (customer relationship management) and business intelligence as Frost & Sullivan said they offer opportunities to increase productivity through improved data management.

The consultancy added that the economic slowdown may trigger a rise in mergers and acquisitions - which could create significant opportunities for IT consulting and systems integration organisations

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Job security is on the mind for IT contratcors

The economic gloom and financial turmoil seems to have worried some IT freelancers. Research by contractor services provider, giant group, finds more freelancers are now ranking job security as a top priority than three months ago - 20 per cent compared to 16 per cent in the second quarter of 2008. Meanwhile, long-term unemployment has increased 11 per cent in the past three months, to 5.3 per cent of contractors, compared to 4.7 per cent in the second quarter.

Matthew Brown, managing director of giant group, said economic gloom is having "a sudden and dramatic impact on contractor joblessness" - especially for those who work in financial services.

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An Overview of FTP

The File Transfer Protocol FTP runs exclusively over TCP. It defaults to listen on port 21 for incoming connections from FTP clients. A connection to this port from the FTP Client forms the control stream on which commands are passed to the FTP server from the FTP client and on occasion from the FTP client to the FTP server. FTP uses out-of-band control, which means it uses a separate connection for control and data. Thus, for the actual file transfer to take place, a different connection is required which is called the data stream. Depending on the transfer mode, the process of setting up the data stream is different. Port 21 for control(or program), port 20 for data.

In **active mode**, the FTP client opens a dynamic port, sends the FTP server the dynamic port number on which it is listening over the control stream and waits for a connection from the FTP server. When the FTP server initiates the data connection to the FTP client it binds the source port to port 20 on the FTP server.

In order to use active mode, the client sends a PORT command, with the IP and port as argument. The format for the IP and port is "h1,h2,h3,h4,p1,p2". Each field is a decimal representation of 8 bits of the host IP, followed by the chosen data port. For example, a client with an IP of 192.168.0.1, listening on port 49154 for the data connection will send the command "PORT 192,168,0,1,192,2". The port fields should be interpreted as $p1 \times 256 + p2 = port$, or, in this example, $192 \times 256 + 2 = 49154$.

In **passive mode**, the FTP server opens a dynamic port, sends the FTP client the server's IP address to connect to and the port on which it is listening (a 16-bit value broken into a high and low byte, as explained above) over the control stream and waits for a connection from the FTP client. In this case, the FTP client binds the source port of the connection to a dynamic port.

To use passive mode, the client sends the *PASV* command to which the server would reply with something similar to "227 Entering Passive Mode (127,0,0,1,192,52)". The syntax of the IP address and port are the same as for the argument to the PORT command.

In **extended passive mode**, the FTP server operates exactly the same as passive mode, however it only transmits the port number (not broken into high and low bytes) and the client is to assume that it connects to the same IP address that was originally connected to. Extended passive mode was added

by RFC 2428 in September 1998.

While data is being transferred via the data stream, the control stream sits idle. This can cause problems with large data transfers through firewalls which time out sessions after lengthy periods of idleness. While the file may well be successfully transferred, the control session can be disconnected by the firewall, causing an error to be generated.

The FTP protocol supports resuming of interrupted downloads using the REST command. The client passes the number of bytes it has already received as argument to the REST command and restarts the transfer. In some commandline clients for example, there is an often-ignored but valuable command, "reget" (meaning "get again") that will cause an interrupted "get" command to be continued, hopefully to completion, after a communications interruption.

Resuming uploads is not as easy. Although the FTP protocol supports the APPE command to append data to a file on the server, the client does not know the exact position at which a transfer got interrupted. It has to obtain the size of the file some other way, for example over a directory listing or using the SIZE command.

In ASCII mode (see below), resuming transfers can be troublesome if client and server use different *end of line* characters.

The objectives of FTP, as outlined by its RFC, are:

1. To promote sharing of files (computer programs and/or data).
2. To encourage indirect or implicit use of remote computers.
3. To shield a user from variations in file storage systems among different hosts.
4. To transfer data reliably, and efficiently.

Criticisms of FTP

- Passwords and file contents are sent in clear text, which can be intercepted by eavesdroppers. There are protocol enhancements that remedy this, for instance by using SSL, TLS or Kerberos.

- Multiple TCP/IP connections are used, one for the control connection, and one for each download, upload, or directory listing. Firewalls may need additional logic and/or configuration changes to account for these connections.

- It is hard to filter active mode FTP traffic on the client side by using a firewall, since the client must open an arbitrary port in order to receive the connection. This

problem is largely resolved by using passive mode FTP.

- It is possible to abuse the protocol's built-in proxy features to tell a server to send data to an arbitrary port of a third computer; see FXP.

- FTP is a high latency protocol due to the number of commands needed to initiate a transfer.

- No integrity check on the receiver side. If a transfer is interrupted, the receiver has no way to know if the received file is complete or not. Some servers support extensions to calculate for example a file's MD5 sum (e.g. using the SITE MD5 command), XCRC, XMD5, XSHA or CRC checksum, however even then the client has to make explicit use of them. In the absence of such extensions, integrity checks have to be managed externally.

- No date/timestamp attribute transfer. Uploaded files are given a new current timestamp, unlike other file transfer protocols such as SFTP, which allow attributes to be included. There is no way in the standard FTP protocol to set the time-last-modified (or time-created) datestamp that most modern filesystems preserve. There is a draft of a proposed extension that adds new commands for this, but as of yet, most of the popular FTP servers do not support it.

Security problems
The original FTP specification is an inherently insecure method of transferring files because there is no method specified for transferring data in an encrypted fashion. This means that under most network configurations, user names, passwords, FTP commands and transferred files can be "sniffed" or viewed by anyone on the same network using a packet sniffer. This is a problem common to many Internet protocol specifications written prior to the creation of SSL such as HTTP, SMTP and Telnet. The common solution to this problem is to use either SFTP (SSH File Transfer Protocol), or FTPS (FTP over SSL), which adds SSL or TLS encryption to FTP as specified in RFC 4217.

FTP return codes
FTP server return codes indicate their status by the digits within them. A brief explanation of various digits' meanings are given below:

- 1xx: Positive Preliminary reply. The action requested is being initiated but there will be another reply before it begins.
- 2xx: Positive Completion reply. The action requested has been completed. The client may now issue a new command.

- 3xx: Positive Intermediate reply. The command was successful, but a further command is required before the server can act upon the request.
- 4xx: Transient Negative Completion reply. The command was not successful, but the client is free to try the command again as the failure is only temporary.
- 5xx: Permanent Negative Completion reply. The command was not successful and the client should not attempt to repeat it again.
- x0x: The failure was due to a syntax error.
- x1x: This response is a reply to a request for information.
- x2x: This response is a reply relating to connection information.
- x3x: This response is a reply relating to accounting and authorization.
- x4x: Unspecified as yet
- x5x: These responses indicate the status of the Server file system vis-a-vis the requested transfer or other file system action.

Anonymous FTP

A host which provides an FTP service may additionally provide Anonymous FTP access as well. Under this arrangement, users do not strictly need an account on the host. Instead the user typically enters 'anonymous' or 'ftp' when prompted for username. Although users are commonly asked to send their email address as their password, little to no verification is actually performed on the supplied data.

As modern FTP clients typically hide the anonymous login process from the user, the ftp client will supply dummy data as the password (since the user's email address may not be known to the application). For example, the following ftp user agents specify the listed passwords for anonymous logins:

Mozilla Firefox (2.0) — mozilla@example.com

KDE Konqueror (3.5) — anonymous@

wget (1.10.2) — -wget@

lftp (3.4.4) — lftp@

The Gopher protocol has been suggested as an alternative to anonymous FTP, as well as Trivial File Transfer Protocol and File Service Protocol.

Data format

While transferring data over the network, several data representations can be used. The two most common transfer modes are:

1. ASCII mode
2. Binary mode: In "Binary mode", the sending machine sends each file byte for byte and as such the recipient stores the bytestream as it receives it. (The FTP standard calls this "IMAGE" or "I" mode)

In "ASCII mode", any form of data that is not plain text will be corrupted. When a file is sent using an ASCII-type transfer, the individual letters, numbers, and characters are sent using their ASCII character codes. The receiving machine saves these in a text file in the appropriate format (for example, a Unix machine saves it in a Unix format, a Windows machine saves it in a Windows format). Hence if an ASCII transfer is used it can be assumed plain text is sent, which is stored by the receiving computer in its own format. Translating between text formats might entail substituting the *end of line* and *end of file* characters used on the source platform with those on the destination platform, e.g. a Windows machine receiving a file from a Unix machine will replace the line feeds with carriage return-line feed pairs. It might also involve translating characters; for example, when transferring from an IBM mainframe to a system using ASCII, EBCDIC characters used on the mainframe will be translated to their ASCII equivalents, and when transferring from the system using ASCII to the mainframe, ASCII characters will be translated to their EBCDIC equivalents.

By default, most FTP clients use ASCII mode. Some clients try to determine the required transfer-mode by inspecting the file's name or contents, or by determining whether the server is running an operating system with the same text file format.

The FTP specifications also list the following transfer modes:

1. EBCDIC mode - this transfers bytes, except they are encoded in EBCDIC rather than ASCII. Thus, for example, the ASCII mode server
2. Local mode - this is designed for use with systems that are word-oriented rather than byte-oriented. For example mode "L 36" can be used to transfer binary data between two 36-bit machines. In L mode, the words are packed into bytes rather than being padded. Given the predominance of byte-oriented hardware nowadays, this mode is rarely used. However, some FTP servers accept "L 8" as being equivalent to "I".

In practice, these additional transfer modes are rarely used. They are however still used by some legacy mainframe systems.

The text (ASCII/EBCDIC) modes can also be qualified with the type of carriage control used (e.g. TELNET NVT carriage control, ASA carriage control), although that is rarely used nowadays.

Note that the terminology "mode" is technically incorrect, although commonly used by FTP clients. "MODE" in RFC 959 refers to the format of the protocol data stream (STREAM, BLOCK or COMPRESSED), as opposed to the format of the underlying file. What is commonly called "mode" is actually the "TYPE", which specifies the format of the file rather than the data stream. FTP also supports specification of the file structure ("STRU"), which can be either FILE (stream-oriented files), RECORD (record-oriented files) or PAGE (special type designed for use with TENEX). PAGE

STRU is not really useful for non-TENEX systems, and RFC1123 section 4.1.2.3 recommends that it not be implemented.

FTP and web browsers

Most recent web browsers and file managers can connect to FTP servers, although they may lack the support for protocol extensions such as FTPS. This allows manipulation of remote files over FTP through an interface similar to that used for local files. This is done via an FTP URL, which takes the form ftp(s):// (e.g., ftp://ftp.gimp.org/). A password can optionally be given in the URL, e.g.: ftp(s)://:@:. Most web-browsers require the use of passive mode FTP, which not all FTP servers are capable of handling. Some browsers allow only the downloading of files, but offer no way to upload files to the server.

FTP and NAT devices

The representation of the IPs and ports in the PORT command and PASV reply poses another challenge for NAT devices in handling FTP. The NAT device must alter these values, so that they contain the IP of the NAT-ed client, and a port chosen by the NAT device for the data connection. The new IP and port will probably differ in length in their decimal representation from the original IP and port. This means that altering the values on the control connection by the NAT device must be done carefully, changing the TCP Sequence and Acknowledgment fields for all subsequent packets.

For example: A client with an IP of 192.168.0.1, starting an active mode transfer on port 1025, will send the string "PORT 192,168,0,1,4,1". A NAT device masquerading this client with an IP of 192.168.15.5, with a chosen port of 2000 for the data connection, will need to replace the above string with "PORT 192,168,15,5,7,208".

The new string is 23 characters long, compared to 20 characters in the original packet. The Acknowledgment field by the server to this packet will need to be decreased by 3 bytes by the NAT device for the client to correctly understand that the PORT command has arrived to the server. If the NAT device is not capable of correcting the Sequence and Acknowledgement fields, it will not be possible to use active mode FTP. Passive mode FTP will work in this case, because the information about the IP and port for the data connection is sent by the server, which doesn't need to be NATed. If NAT is performed on the server by the NAT device, then the exact opposite will happen. Active mode will work, but passive mode will fail.

It should be noted that many NAT devices perform this protocol inspection and modify the PORT command without being explicitly told to do so by the user. This can lead to several problems. First of all, there is no guarantee that the used protocol really is FTP, or it might use some extension not understood by the NAT device. One example would be an SSL secured FTP connection. Due to the encryption, the NAT device will be unable to modify the address. As result, active mode transfers will fail only if encryption is used, much to the confusion of the user.

The proper way to solve this is to tell the client which IP address and ports to use for active mode. Furthermore, the

NAT device has to be configured to forward the selected range of ports to the client's machine.

FTP over SSH (not SFTP)

FTP over SSH (not SFTP) refers to the practice of tunneling a normal FTP session over an SSH connection.

Because FTP uses multiple TCP connections (unusual for a TCP/IP protocol that is still in use), it is particularly difficult to tunnel over SSH. With many SSH clients, attempting to set up a tunnel for the *control channel* (the initial client-to-server connection on port 21) will protect only that channel; when data is transferred, the FTP software at either end will set up new TCP connections (*data channels*) which will bypass the SSH connection, and thus have no confidentiality, integrity protection, etc.

If the FTP client is configured to use *passive mode* and to connect to a SOCKS server interface that many SSH clients can present for tunneling, it is possible to run all the FTP channels over the SSH connection.

Otherwise, it is necessary for the SSH client software to have specific knowledge of the FTP protocol, and monitor and rewrite FTP control channel messages and autonomously open new forwardings for FTP data channels. Version 3 of SSH Communications Security's software suite, and the GPL licensed FONC are two software packages that support this mode.

FTP over SSH is sometimes referred to as secure FTP; this should not be confused with other methods of securing FTP, such as with SSL/TLS (FTPS). Other methods of transferring files using SSH that are not related to FTP include SFTP and SCP; in each of these, the entire conversation (credentials and data) is always protected by the SSH protocol.