

Sending faxes through DUAL Talk

Techniques and tips



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Fax support on DUAL Talk

Introduction

This document explains the different methods that the DUAL Talk network offers for sending faxes. It should be understood that DUAL Talk is primarily a voice service. Fax over IP is a complicated technology and its implementation depends upon many factors including the Voice over IP device used and the caller's network connection. We have implemented many features to assist in fax transmission. This document suggests techniques that can be used to increase the chance of successful fax connections.

Please note that faxes are most likely to succeed if you have chosen the DUAL Talk Gold tariff. Many of the routes we use for DUAL Talk Silver and DUAL Talk LCR will not support fax.

Summary

You are encouraged to read this document in its entirety. We offer a brief summary below:

- The primary means of fax transmission on DUAL Talk is the T.38 protocol. We support T.38 negotiation using both the H.323 and SIP protocols.
- If your T.38 supported device has a private IP address, then T.38 transmission requires that the device is fully exposed to a public IP address using your router's DMZ feature. This is not required for voice calls.
- If you are unable to put your calling device in a DMZ, we can enable a feature called "*T.38 NAT Penetration*" on a per-account basis. This feature can sometimes enable T.38 fax calling where the calling device cannot be fully exposed to a public IP address.
- For devices that do not support T.38, the only option for sending faxes is using one of the G.711 codecs. When sending a fax, you will need to force the call to use G.711, often using "*99" as a prefix. G.711 is not enabled on DUAL Talk accounts by default, but can be enabled on request.
- G.711 consumes high bandwidth.
- DMZ settings are not required when using a G.711 codec for fax transmission.

Recent changes

DUAL Talk has supported fax transmission using T.38 over H.323 since 2003. In November 2007, we introduced the following new features in order to enable more customers to be able to send faxes:

- Support for T.38 over SIP was added
- The "*T.38 NAT Penetration*" was added, allowing devices with no exposure to a public IP address to send T.38 fax transmissions.

Further assistance

Some experimentation will be required to successfully implement fax calling from your devices. Our Technical Support team (support@dualtalk.com) are able to advise you on the options, but we ask that you study this document thoroughly before contacting them.

Fax transmission methods

The remainder of this document describes the two main methods of fax transmission on DUAL Talk. These are *T.38 real time fax transmission* and *G.711 pass-through*.

T.38 real time fax transmission

A description of T.38

T.38 is a protocol that defines a way in which two devices may transmit real time fax information to each other over IP based networks. The detail of T.38 is not important for the purposes of this document. But, it should be mentioned that there are currently three methods of sending this T.38 encoded data:

- Using UDP streams between the two devices
- Using a TCP connection between the two devices
- Embedding the T.38 information within RTP streams over UDP between the two devices

DUAL Talk only supports the first method (T.38 over UDP), which is by far the most popular and supported method in use.

T.38 negotiation

In order to establish T.38 communications, the two devices (your Voice over IP device and the DUAL Talk network) must successfully negotiate a switch to T.38. When the DUAL Talk network detects that the called number has been answered by a fax machine, we will send a message to your equipment to request a switch to T.38. Your device will acknowledge this request and will negotiate a new transmission path for the T.38 data.

This renegotiation from a voice call to a T.38 fax call will be attempted for both H.323 and SIP calling devices. Of course, for the renegotiation to succeed, your H.323 or SIP device must support the T.38 protocol. If the negotiation fails, then the call will be disconnected, unless the original voice call was established using one of the G.711 codecs.

NAT penetration

In many cases, a calling device can share a public IP address with other devices on a LAN using NAT (Network Address Translation). In this case, a NAT device, usually a router, allocates private IP addresses to the devices in its LAN. This technology poses significant challenges for Voice over IP. DUAL Talk overcomes these problems by applying a hardware based NAT penetration solution. This is very effective for voice calls, but does not work for T.38 calls.

If your calling device has a private IP address, then in order to successfully send faxes using T.38, you should enable the DMZ feature on your router and set it to the private IP address of your VoIP device. This will expose your calling device to a public IP address and ensure that the T.38 information we send to your IP address reaches your calling device.

We understand that in some cases, setting a DMZ is not an option. For example, some ISPs only allocate a private IP address to their customers. They manage the NAT devices and so you will not be able to expose your calling device to a public IP address.

In these cases, we can enable a feature called “*T.38 NAT Penetration*” on your account. With this feature, if a call switches to T.38, we bring in a software based NAT penetration system. Please contact our Technical Support team (support@dualtalk.com) if you would like this feature enabled on your account. Due to bugs in some equipment’s firmware, this feature does not work with all devices. Please see the device specific notes in the next section for more information.

Supported devices

We have tested a number of H.323 and SIP devices using DUAL Talk and present our findings below:

Quintum Tenor gateways and MultiPath switches

We have successfully tested Quintum devices using P104 and P105 firmware and sending calls using both H.323 and SIP. The “*T.38 NAT Penetration*” also works with both protocols.

Linksys SPA8000

We have successfully tested Linksys SPA8000 gateways using firmware versions 5.1.12 and 6.1.3. The “*T.38 NAT Penetration*” also works with this adapter.

Welltech 3504a 4 port FXS gateways

We have successfully tested Welltech 3504a gateways using both H.323 and SIP and working with the following firmware releases:

- H323 - 4afsx.205
- SIP - 4asipfxs.114

Due to bugs in both the H.323 and SIP firmware, our “*T.38 NAT Penetration*” feature does not work with this gateway. If one of the FXS lines is permanently connected to a fax machine, then an alternative approach is to split that FXS line into a different DUAL Talk account and apply the software based NAT Penetration system to all calls on that account from when they connect rather than when T.38 is negotiated. This is a simple matter with SIP, but is also possible with H.323. Please contact our Technical Support team (support@dualtalk.com) for more information on this solution.

Elesign ESC1710 FXS gateway

We successfully tested the ESC1710 gateway using H.323 firmware 1.89c. The “*T.38 NAT Penetration*” also works with this gateway. We have not tested the SIP version of the ESC1710.

Other devices

We understand that the Grandstream gateways and the Linksys 3102 support T.38 over SIP. We have not tested these devices.

The Linksys PAP2 (Sipura SPA 2000) and the Cisco ATA 186 **do not** support T.38. It is only possible to send faxes from these gateways using a G.711 codec. The following sections describe that method.

G.711 pass-through

Sending faxes without T.38

When the DUAL Talk switch detects that a telephone number has been answered by a fax machine, it attempts to start T.38 procedures by sending a negotiation request to your gateway. If your gateway does not support T.38, then the call will usually be cleared by us. Fax calls cannot proceed using our standard G.729 and G.723.1 codecs, which are designed for voice transmission only. Fax tones are degraded by these codecs, making fax transmission impossible.

But, if the call uses a G.711 codec, then this codec can be successfully used for fax transmission after T.38 procedures fail. We do not support a mid-call change of codecs, so the call must be set up using a G.711 codec.

This system of fax transmission works for both H.323 and SIP devices.

Higher bandwidth requirement

By default, G.711 is disabled on DUAL Talk accounts. G.711 has a high bandwidth requirement and its use is inappropriate when multiple concurrent calls are sent through an ADSL internet connection. A G.711 call will consume between 80kbps and 100kbps of bandwidth in each direction.

We are willing to allow G.711 calls on accounts for fax purposes only. If you would like G.711 to be enabled on your account, please contact our Technical Support team (support@dualtalk.com).

Forcing the use of G.711 (PAP2 and ATA 186)

When a device sends a call, it will usually offer a number of codecs for the call. For both H.323 and SIP, the called party (ie. the DUAL Talk network) will select a codec to use for the call. If G.729 or G.723.1 are offered by your device, then one of those codecs will be chosen for the call and the fax will consequently fail. When you send a fax, you will need to ensure that your device only offers the G.711 codecs for the call. We will connect the call using G.711, assuming that your account has been enabled for G.711 calls, and subsequent fax calls should succeed.

For simple ATA devices, there is often an easy way to force a call to use G.711. If you dial “*99” before the destination number, the call will only use G.711. Sometimes, “*99#” is required. This code forces some ATAs to make a *modem call* which stops low bit rate codecs from being used. This method is supported by the Linksys PAP2 and Cisco ATA 186 when using their recommended DUAL Talk configuration settings.

NAT Penetration

No special settings are needed on your account or your NAT device if your device has a private IP address. Our system will treat the call as a voice call rather than a fax call, and our normal hardware based NAT Penetration system will continue to work for the duration of the call.