
Technology For Fax System Developers

Product deployment note



The market needs

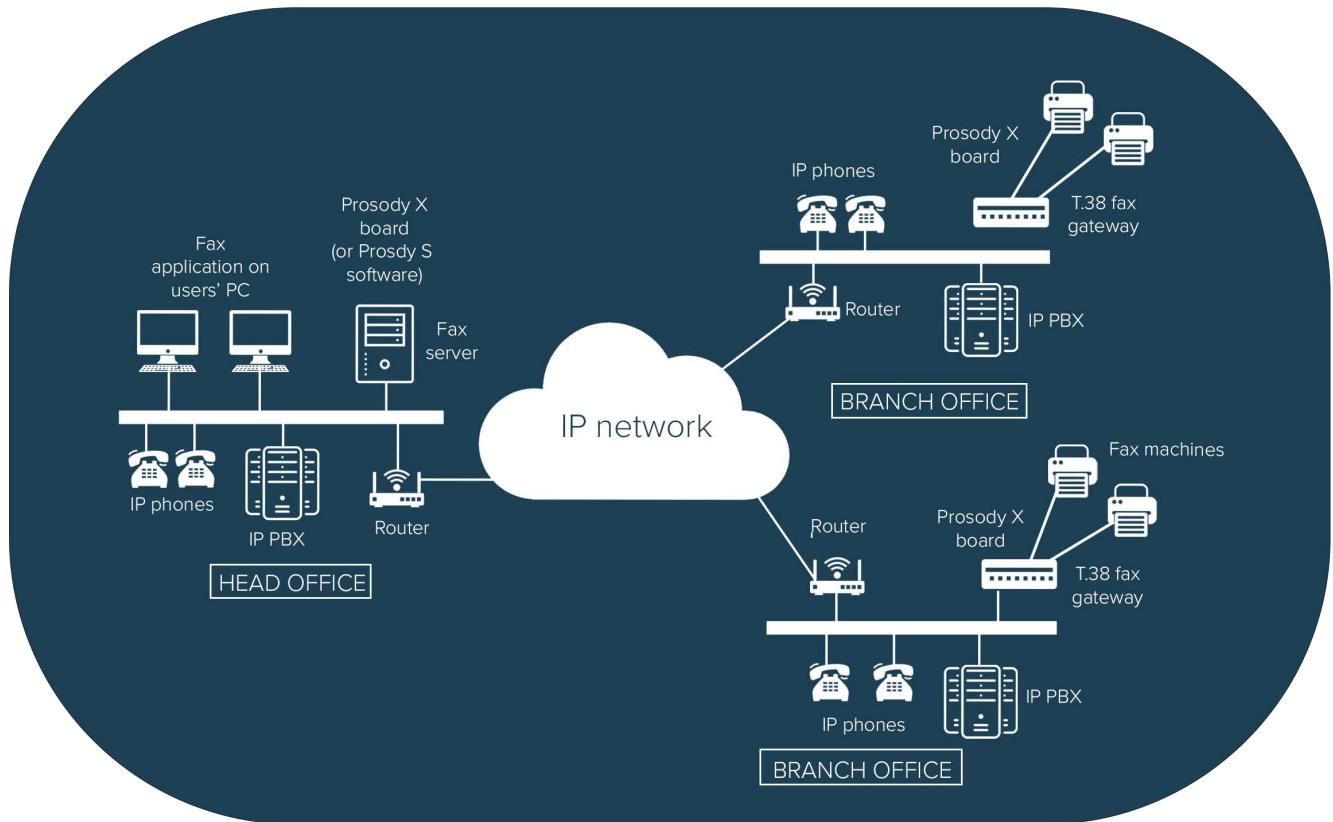
In an email dominated world, fax broadcast is still a key application for many enterprises. However, the distinction between sending a fax and sending an email is blurring due to technological advances. Desktop or Internet fax, where the fax application resides on a user's PC and fax transmissions are completed by sending/receiving the fax using standard email clients, is now commonplace.

Any TDM- or IP-based fax broadcast or relay system must offer reliability, high performance and high density to cost-effectively meet the needs of SME and corporate users. A network-based fax server, built from high-density, intelligent fax boards, provides an efficient and effective fax service as part of a corporate document management and business process automation system. Whether in-house or hosted, a computer-based fax server readily enables an organization to comply with regulations such as Sarbanes-Oxley, HIPAA, and Basel II.

For enterprises migrating to IP-based PBXs but wishing to keep their existing fax machines, another problem arises - how to connect the analog-based fax machines to the IP network. The solution comes in the form of a gateway to translate between TDM- and IP-based fax. Such a T.30-to-T.38 fax gateway should seamlessly integrate the fax machines into the enterprise IP network, and offer Fax over IP (FoIP) to interoperate with different vendors' fax machines and IP-PBXs.

The Aculab solution

Aculab technology for fax solution developers



Aculab Cloud, Aculab's Prosody X high density, high performance, intelligent fax boards and Prosody S with T.38 fax software provide the enabling technology for communications system developers to create a variety of fax applications to integrate fax transmission with TDM and/or IP networks.

Fax applications where the Prosody portfolio can be used include:

- Fax servers
- HylaFAX servers (built using the open source HylaFAX fax server)
- Fax-to-email servers
- T.30-to-T.38 fax gateways
- Fax broadcasting
- Internet fax
- Desktop fax
- Fax relay
- Fax over IP (FoIP)

The example shown in the figure is a hybrid solution using fax gateways to enable the re-use of existing fax machines and fax server technology to replace standalone fax machines and integrate fax and email; this example is typical of a bank or financial institution with a headquarters and multiple branch offices.

The scalability of the Prosody portfolio has also been used effectively to build high density hosted fax server applications. With the ability to support close to 1000 fax transmit channels per faxboard, a large scale, hosted fax server application can be built in a cost and space efficient manner. For the more DSP resource intensive V.34 fax protocol, a Prosody X PCIe Fax Board still supports an impressive 160 transmit channels. Alternatively, Prosody S can support up to 1600 T.38 fax channels in a single commodity Linux server.

For developers who favour the HylaFAX open source fax server, Aculab's Prosody X resource boards are ideal. Further information can be found in our HylaFAX application note.

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Class leading interoperability

For any benchmark figure to be meaningful, a common method has to be employed in producing results. With facsimile, there are many legitimate reasons for a transmission to fail and these should be factored out when comparisons are sought. The most significant factor is the time of day. Many fax machines are switched off outside business hours and, at certain times, as little as 20 percent of faxes can make it through.

Also, an obvious problem is that the published fax number no longer exists or has changed use and is answered by a person. Additionally, network line issues, such as signal-to-noise ratio, echo cancellation and attenuation, affect the success or otherwise of any fax transmission. And finally, there is fax machine compatibility.

The T.30 fax protocol is a recommendation rather than a standard and much of it is commonly violated when implemented in fax terminals. With over 100 million fax machines in existence and many in use that are 10, 15 and even 20 years old, it is practically impossible to achieve interoperability with every conceivable machine. Indeed, industry experts suggest that a figure exceeding 80 percent is commendable. Profitably for developers and service providers, Aculab's fax capability is second to none. In any like-for-like scenario, where compatibility is the sole issue, a fax transmission success rate of 95 percent is the interoperability challenge for competing products.

Aculab's partnership approach

When you decide to partner with Aculab, the leading-edge products are just the start of what we offer. Complementing the product range, we offer customers a solid vendor partnership in the field of professional services, ongoing development and support based on our in-depth expertise and experience. The foundation of Aculab's approach is our industry-recognised agility and willingness to meet and exceed our customer's demands.

We focus on our customers recognising that their success is our success, and we are willing to listen and invest in the

technology they need to achieve their goals. One of the key areas that sets Aculab apart is our ability to respond to customers' near term requirements through our request for change (RFC) process. We were asked to add the faster V.34 fax protocol to our existing fax protocol support on the Prosody portfolio. Our target was based upon the customers' expectation that 100 channels per fax board would be required to meet the platform performance targets, a figure un-available from competing solutions. We were able to far exceed all expectations by delivering 160 V.34 fax channels per faxboard.

Visit our showcase section for a list of partners offering fax servers and applications based on Aculab's technology.

Visit the media processing pages to see case studies showing how other customers have used Aculab products to develop fax server/gateway solutions.

Visit the Aculab Cloud product page to understand how this cloud telephony platform can be used for fax systems.

The Aculab solution

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Prosody portfolio for fax systems:

Fax system requirement	Aculab media processing functionality
Scalability	The Prosody family can provide a fax server system scalable from just a few channels on Prosody S HMP software through to hundreds of channels per fax board with Prosody X. Specific channel counts are dependent on the fax protocol and host processor power
Reliability	Prosody X Fax boards and Prosody S HMP with T.38 fax software can be operated in a distributed architecture to provide network resilience
Integration with IVR systems	The same Prosody X boards or Prosody S HMP software platform can provide both fax support and IVR functions enabling tight integration of the end user system as required
Support for multiple fax standards	<ul style="list-style-type: none"> • V.17, V.21, V.27ter, V.29 and V.34 • RFC2306 Group 3 TIFF • T.30 • T.38 (Fax over IP) • ITU-T T4 and T6 (MH, MR and MMR with ECM)
Interoperable with many IP PBX vendors	Supports T.38 real-time fax over IP (FoIP) with T.30-to-T.38 gateway functionality
Efficient fax handling	The Prosody series offers a TIFF image manipulation library, which allows the generation of TIFF images from ASCII text input. An application is able to control the selection and transmission of fax header and individual pages, control page length and resolution and insert blank, cover, or text only pages.
Features summary	<ul style="list-style-type: none"> • T.30 fax termination/relay protocol up to V.34 speeds • T.38 real-time fax over IP (FoIP) with T.30-to-T.38 gateway function • Call progress monitoring (incoming and outgoing) • Automatic detection of fax calls • Dynamic switching between fax and voice within a call • Powerful and comprehensive API • Group 3 TIFF image file manipulation library • Supports multiple page formats and properties • Supports single documents with multiple image formats • Application control of individual pages • Supports unlimited page length and header/footer formatting • Supports fax on demand - polled mode fax • Integrates with HylaFAX server systems

Group 3 fax and image compression conformance

Aculab's Group 3 fax conforms to the following ITU-T and IETF specifications:

V.21 300 bits/s for T.30 fax negotiation

V.17 7200; 9600; 12 000; and 14 400 bits/s

V.27ter 2400; and 4800 bits/s

V.29 7200; and 9600 bits/s

V.34 up to 33 600 bits/s

ECM Error correction mode - transmission and reception supported

RFC2306 Group 3 TIFF

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ITU-T data modems are also available to developers for use independently, using the TiNG architecture and the data communications API for the Prosody family.

Images can be received or transmitted in TIFF format using the following compression algorithms according to ITU-T recommendations:

MH (1D) Modified Huffman data compression (ITU-T T.4)

MR (2-D) Modified Read data compression (ITU-T T.4)

MMR Modified Modified Read data compression (ITU-T T.6); ECM only

Product					
		Prosody X PCIe and PCI boards			Prosody S HMP
Feature	Feature detail	Maximum channels per DSP	Maximum channels per PCIe board	Maximum channels per PCI board	Maximum channels per host platform
	V.27ter	120	480	480	
	V.29				
	V.17	120	480	480	
	V.34	40	160	160	
	V.27ter	90	360	360	
	V.29	64	256	256	
	V.17	35	140	140	
	V.34	20	80	80	
	T.38	200 ²	800 ³	800 ³	400 ⁴

1. For fax termination (non-gateway mode); simultaneous transmit or receive using V.17 emulation.

2. Quoted figure is based on a Prosody X board using 2 DSPs in a 3.192GHz server fitted with 1Gb of RAM.

3. Above 2 DSPs, the number of simultaneous fax channels per board is dependant on the host system performance.

4. For Prosody S, the number of simultaneous fax channels is dependant on the host system performance.

About Aculab

Aculab is an innovative company that offers deployment proven technology for any telecoms related application. Its enabling technology serves the evolving needs of automated and interactive systems, whether on-premise, data centre hosted, or cloud-based.

Over 1000 customers in more than 80 countries worldwide, including developers, integrators, and solutions and service providers, have adopted Aculab's technology for a wide variety of business critical services and solutions.

Aculab offers development APIs for voice, data, fax and SMS, on hardware, software and cloud-based platforms, giving a choice between capital investment and cost-effective, 'pay as you go' alternatives.

For more information

To learn more about Aculab Cloud and Aculab's extensive telephony solutions visit:

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