Floreat, Inc.
Embedded Multimedia and Communications Software

T.38 Real Time Fax over IP Protocol Software (T.38 FoIP Software)

To become an integral part of the Universal Messaging infrastructure, real time IP fax must be based on accepted industry standards. T.38 is the ITU-T standard governing real-time fax relay over IP networks. It was ratified in 1998 by Study Group 8 of the ITU. It defines procedures to allow Group 3 fax transmission between terminals when a portion of the path includes an IP network.

The architectural framework of the T.38 recommendation is to have a traditional Group 3 fax terminal connected to a gateway/router which encodes the fax signal into IP fax packets and sends the signal through an IP network to a receiving gateway which decodes the IP fax packets into fax signals and makes a PSTN call to the facsimile equipment on the other side. Another scenario is the connection at either end to a fax enabled device like a PC directly connected to an IP framework.

Fax could be transported by networks without a relay engine provided the network is very high performance with low packet loss, delay and jitter. But in an imperfect real world, the use of T.38 compliant relay enables the gateway to withstand problems of network impairments without creating errors in the received image. Products claiming compliance with H.323 must support T.38. The T.38 standard is crucial to building a framework of real-time Fax over IP. Real-time fax over IP used instead of or in combination with store and forward fax gives users the same satisfaction they get from fax machines along with substantial cost savings. T.38 then produces clean faxes but presents inter-operability problems that any service provider would face if it intends to use T.38 capable gateways from multiple vendors. Any T.38 solution must also have addressed these interoperability issues.

An internet aware facsimile device would have the T.38 implemented within the device itself. Thus the user could send and receive faxes via a PSTN or send and receive Real-time T.38 faxes via the Internet or make copies of documents.

Any two G3 fax devices communicate with each other over the PSTN. The protocols inside the fax machine consist mostly of the T.4 image protocol, the T.30 state machine and the different V.xx Group 3 fax modems. The gateways in the IP network case must act as they are fax machines. The G3Fax devices only understand the T.30 state machine and T.4 related data. This means that the gateway must have the exact same protocols as the fax machine that it is connected to, but it must also contain a part to be able to communicate this data over the IP network. The T.38 specifies two ways of doing this, TCP or UDP. T.38 specifies a special kind of layer such that the T.38 messages exchanged for TCP and UDP look identical. The Internet Fax Protocol (IFP) packets are wrapped inside a TCP header. These are then wrapped inside an IP header. Error checking is built into the TCP protocol.

The IPF protocol conforms to the HDLC frames format used by the T.30 protocol, every T.30 message has been mapped into a corresponding T.38 IFP message, so a G3 Fax device will not know that it is not communicating directly with another G3 Fax device.

Floreat's T.38 Fax over IP (Fax Relay) software provides reliable real-time fax service between two analog fax machines over an IP network.

Floreat's T.38 software provides a fully compliant implementation of the ITU-T T.38 Fax Relay Protocol for real-time Group 3 fax communications over IP networks. Floreat's T.38 software permits end-users to send a fax over the PSTN from a PSTN-connected fax terminal to any T.38-supporting gateway, then over an IP network to another such terminal using Floreat's T.38 software, to finally terminate in an IP-media server or a PSTN receiving fax terminal.

Features:

- All required features of ITU-T T.38 along with the data pump, which includes V.34, V.17, V.29, V.27ter, V.21ch.2
- T.30 and T.4 control protocols
- Multiple channel capability, code is modular, re-entrant and re-locatable
- UDP and TCP modes of packet-transfer
- Interoperability tested using wide variety of commercial fax machines and with Genoa software simulating 100+ fax machines
- Third Party Compatibility for TCP and UDP transport modes
- Handles IP network impairments such as lost packets, network delay, jitter (variable delay)
- C-Code facilitates porting to different platforms
- Available with fully integrated and tested Fax Modem or just as a Fax Relay Protocol Software Engine

Floreat's Fax modem protocols are modular, re-locatable and re-entrant to support multi-channel capability. This protocol software can operate within a multi-tasking environment or as a single task and it is supported on various DSPs and processors as well as offered in fixed and floating point C.

Floreat's fax Modem protocols can be integrated with Floreat's other data modem, telephony, speech compression, VoIP, FoIP, imaging and video software for various applications.

Floreat supports its software on the following DSPs, Controllers and Processors

- TI C5000 and C6000
- Intel Pentium fixed and floating point and XScale
- ADI Blackfin (BF53x), SHARC 21xxx
- ARM 7/9/9E, MIPS
- PowerPC, STM, SuperH cores, Philips Nexperia
- CEVA (formerly DSPG's licensing division)
- Ported by customers to their processors:
  - NEC
  - STM
  - Zilog

- For further information on the standard, please click **ITU Standards**.
- For our brief profile, please click **Company Profile**.
- For further inquiry, please send us an **Inquiry Form** or send an email to **info@floreatinc.com**.

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