

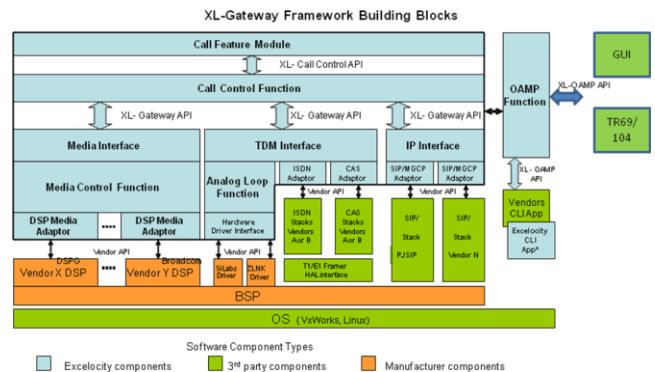


## Excelocity Voice and Video over Packet "A Turn-key Solution!"

Excelocity has been developing Voice over Packet solutions for customers that include Tier 1 and Tier 2 telecom product vendors for over 6 years. The solutions have included developing turn key Voice over Packet Gateway and Voice over Packet Terminal products on different new or existing hardware and OS platforms. With the Excelocity new development platform, the XL- Gateway Framework, the development of custom Gateways is being brought to a new higher level of cost effectiveness and quality. The framework is designed to be used in custom design solutions to accelerate the time to market, reduce the development costs and enable the easy integration of proven quality components to the solution. It can be used for the custom development of a wide variety of Voice and Video over Packet product solutions.

### Excelocity XL-Gateway Framework Overview

Based on its experience developing embedded converged solutions, Excelocity has developed a framework solution that can be used to develop a wide variety of Voice and Video over IP solutions very cost effectively and with improved quality. The framework includes a number of pre-designed control functions as well as well defined APIs that can be used within the framework or on their own as independent building blocks.



Some of the key design benefits of the XL-Gateway Framework tool kit are:

- A framework independent of the HW and OS platforms as well as the Digital Signal Processors (DSP) provides flexibility in the scope of the designs that can be addressed.
- By using software adaptors it is easy to use or port the best available components (HW and SW) for building Voice and Video over IP products (V<sup>2</sup>oIP).
- It is scalable and can be used for building small and large footprint V<sup>2</sup>oIP products.
- It is applicable to both standalone gateways and embedded ones that run on existing HW platforms such as routers, switches etc.

The diagram illustrates the various components or building blocks of the V<sup>2</sup>oIP framework.

## Excelocity V<sup>2</sup>oP turn-key solution

### **Excelocity XL-Gateway Building Block Functions**

The Excelocity XL-Gateway Framework contains a number of major building block functions such as the ones for Call Control, Media Control, Signaling and Analog Line control. These control functions are self contained with their own functional software components and APIs. They are also standalone modules and are OS and Hardware independent and reusable so that their functionality may be used in any design where it is applicable. They do not have to be used only within the XL-Gateway Framework.

The diagram illustrates how the various building block functions, adaptors and 3<sup>rd</sup> party software components and are related within the context of the XL-Gateway Framework. In most cases the functions inter work via a defined set of APIs that are either Excelocity based or Vendor based. Where there is a vendor API to a DSP or Software Stack, Excelocity has designed adaptor functions that mask the vendor specific controls from the higher level APIs via the adaptor functions.

This enables reuse of the major building blocks, rapid customization to specific vendor solutions and the development of a library of pre-designed vendor adaptors that can be plugged in as required.

The four major XL-Gateway Functions are:

#### **1) Call Control Function:**

The Call Control function manages the call finite state machine of any call and interfaces with the line and trunk call control protocol stacks as well as a media control engine. The Media control engine can be either custom built or the Excelocity Media Control function can be used. That will depend on the specific design requirements.

Using the Call Control APIs to the Call Feature functional level, the feature or application developers can work with a more logical environment to implement various features and call interactions. They can then let the Call Control function deal with all the lower level interactions such as those associated with the finite state machine, protocol message mapping and the commands to control the DSPs and chips.

The Call Control function has a call processing module that handles all normal and exception call conditions, along with an error and monitoring set of functions. It can be programmed to interact with the high level features to ensure a proper set of call/feature interactions. It can also be programmed to handle any type of basic call structure required as well without any additional features.

#### **2) Media Control Function:**

The Media Control function manages the specific vendors DSP engines for the VoIP chip sets. It interprets the control messages from the Call Control function or application and manages the VoIP line side chip sets to affect call processing and aggregating functions.

The Media Control function includes the Media Manager, Media Agents, timer control and a core sequencer for the media streams. The module establishes the media signaling streams and the enablement of the voice calls. It provides queue and time management, message handling and a centralized event logging of errors, alarms, stats, and debugging information. It also does the Digit Map or dial plan parsing based on the MGCP model.

## Excelocity V<sup>2</sup>oP turn-key solution

### 3) Signaling Control Functions:

The signaling control is generally composed of both TDM signaling as well as IP signaling although that depends on the design. These functions are managed via two separate modules and provide the protocol and signaling message mapping between the vendor specific communication protocol stacks and the Call Control function.

**i) TDM signaling function** is composed of Trunk and Analog Line control function described below.

**Digital Trunk signaling Function** is offered for ISDN Primary Rate Interface (PRI) and Channel Associated Signaling (CAS) on T1/E1 trunks. These adaptor modules provide the mapping from and to the specific vendor PRI and/or CAS protocol stacks.

**The Analog Line control function** is another unique capability designed by Excelocity. It incorporates a significant amount of Voice Analog Telephony line engineering knowledge in the design. This module controls via the SPI (Serial Program Interface) Hardware Adaptation Layer module, the DSP chip sets that control the line side SLIC (Subscriber Line Side Interface) and SLAC (Subscriber Line Access Control) hardware. These adaptation modules are used to program the solution to match the VoIP and SLIC/SLAC chips sets chosen for the design. Through the APIs control can be exercised over the codec/filters for call processing and aggregating of the devices. As well, line and device testing and detection can be accomplished to identify problems and understand and control the device states such as off-hook and tone detection.

**ii) IP Signaling function** provides the same mapping functions as the TDM module but for the specific vendor VoIP protocols such as MGCP and/or SIP. In the future IMS and other protocols will be added.

### 4) Supplementary Services (Call feature) Functions:

The module provides the supplementary services for the analog and digital trunks. It is a standalone module and is only required for the call features such as:

- Call Hold
- Call Waiting
- Call Forwarding (Busy/No answer/Unconditional)
- Call Transfer (attended/unattended)
- Three-way conference

### 5) OAM&P Functions:

The module provides the interface to the Operations, Administration, Maintenance & Provisioning (OAM&P) functions. The OAM&P server includes the following:

- An interface to a CLI (Command Line Interface) engine that allows the user to perform OAM&P functions involving the XL-Gateway modules.
- A socket based XL-Gateway OAM&P API that is used to perform OAM&P functions by a 3<sup>rd</sup> party OAM&P front-end SW such as web GUI.
- Relational DB and flat file based data storage and retrieval of provisioned data.
- TR-069/104 in Q1 2014

## Excelocity V<sup>2</sup>oP turn-key solution

**Pre-integrated 3<sup>rd</sup> party protocol stacks** - Excelocity also has pre-designed modules/libraries that support a variety of Protocol stacks from different vendors. We currently support PRI, T1/E1 and CAS TDM signaling protocols and the SIP and MGCP VoIP protocols from our partners. The TDM protocols always require some form drivers for the synchronization with the T1/E1 hardware as so the framework includes those framing adaptors for driving the hardware. (i.e. T1 Framing HAL (Hardware Adaptation Layer) interface). The following are some of the stacks pre-integrated with XLG:

- SIP
  - Radvision
  - CCPU/Trillium
  - Aricent
  - PJSIP
- ISDN/CAS
  - CCPU/Trillium
  - Telesoft

**Pre-integrated data communication SW** – Excelocity offers the XLG based VoIP gateway SW pre-integrated with TeamF1's data communication SW. It has been proven on the Mindspeed Comcerto 1000 platform.

**Pre-integrated 3<sup>rd</sup> party HW platforms** – Excelocity also offers XL-Gateway based fully functional VoIP Gateway on the following HW platforms:

- Mindspeed Comcerto 300/500/1000 Evaluation platforms (VxWorks/Debian/OpenWRT)
- Intel CAP24-60 Evaluation platform – Atom/EP80579 (RedHat Linux)
- Micro-Semi (ex Zarlink) SLIC/SLAC
- SiLabs SLIC/SLAC
- Transwitch Entropia evaluation platform
- Ikanos evaluation platform
- DSPG DVF9918 EVM platform

**Turn-key HW and SW** – Excelocity also offers private label turn-key solution for the low density ATA and VoIP Gateways for the Home and SMB markets. This solution allows our customer to have a ready-made solution for the intended market. This allows them to focus on the value-add features beyond the data and voice gateway features and functionality. Please ask for the brochure.

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## Excelocity V<sup>2</sup>oP turn-key solution

Wi-Fi 802.11 b/g/n

- WEP/WPA

Gigabit Ethernet LAN and WAN ports

Switched LAN ports

FXS ports with VoIP functionality

FXO ports with VoIP functionality

USB

Integration with:

- WiFi
- ADSL
- 4G LTE
- DECT

OpenWRT Linux

Advanced routing, firewall

- DHCP
- DNS
- NAT with ALG

VoIP Gateway

- SIP – IMS ready
- VoIP to FXS/FXO
- VoIP to PSTN
- Supplementary services
- Compressed codecs
- DTMF in/out-of band
- Call progress tones
- Fax pass through and T.38 Fax over IP
- Modem over IP

DLNA uPnP

Web server

Video Gateway

Web based configuration and management

### Excelocity XL-Gateway Framework Benefits

The benefits of using the framework in the development of Gateway product solutions are:

- One integrated design approach ensuring all the right hardware and software are integrated correctly from the beginning.
- 2-3 times improvement on Quality Time-to-Market for building V<sup>2</sup>oIP products
- Choice of Real Time OSes such as Real-Time/embedded Linux and VxWorks
- The individual building blocks and their APIs can be used independently for even more specific designs.
- Due to the separation from the physical levels the same gateway functions can be ported or developed for build for multiple products on different HW and OS platforms.
- Various vendors' DSPs can easily be integrated into the solution as there are generic software or hardware adaptation layer modules that can be used.
- Accelerated development via the integration of the various building blocks into custom code.
- Turnkey HW and SW integrated solution allows our customers to go to market in 3 months.

**Excelocity XL-Gateway Framework turn-key solution can accelerate your Quality Time to Market!**

Please contact us to discuss how we can address your unique Voice or Video over IP Gateway product design and go to market needs.

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