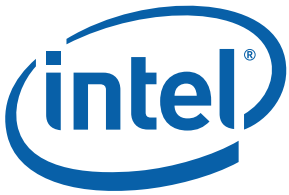

Intel® Infrastructure DSP Solution

Software Product Specification

December 2007

Order Number: 317783-002

Revision History

Date	Revision	Description
December 2007	002	Updated with information related to Intel® Infrastructure DSP Solution Version 1.2
July 2007	001	Initial release

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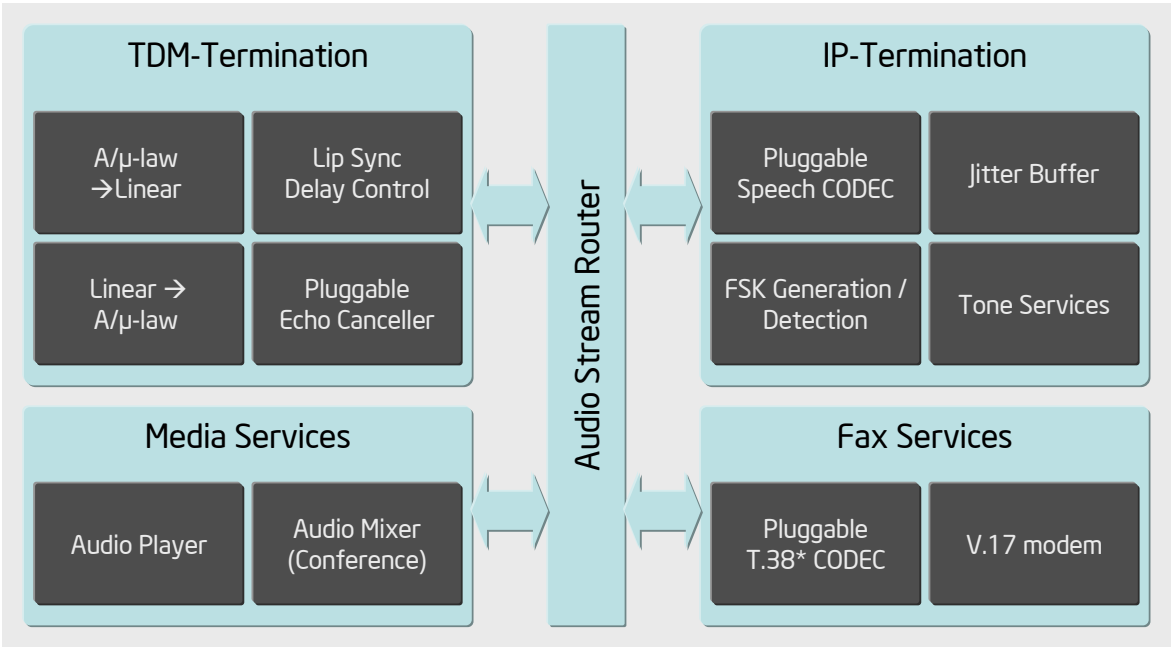
1.0 Brief Description of the Intel® Infrastructure DSP Solution

The Intel® Infrastructure Digital Signal Processing (DSP) Solution provides necessary speech and telephony processing blocks to implement Voice over IP (VoIP) on Intel's network and communications processors. The Intel Infrastructure DSP Solution has a modular architecture and has the capability to plug-in individual codec and functionalities. The architectural block diagram is shown in Figure 1.

Figure 1. Fuctional Block Diagram of the Intel® Infrastructure DSP Solution

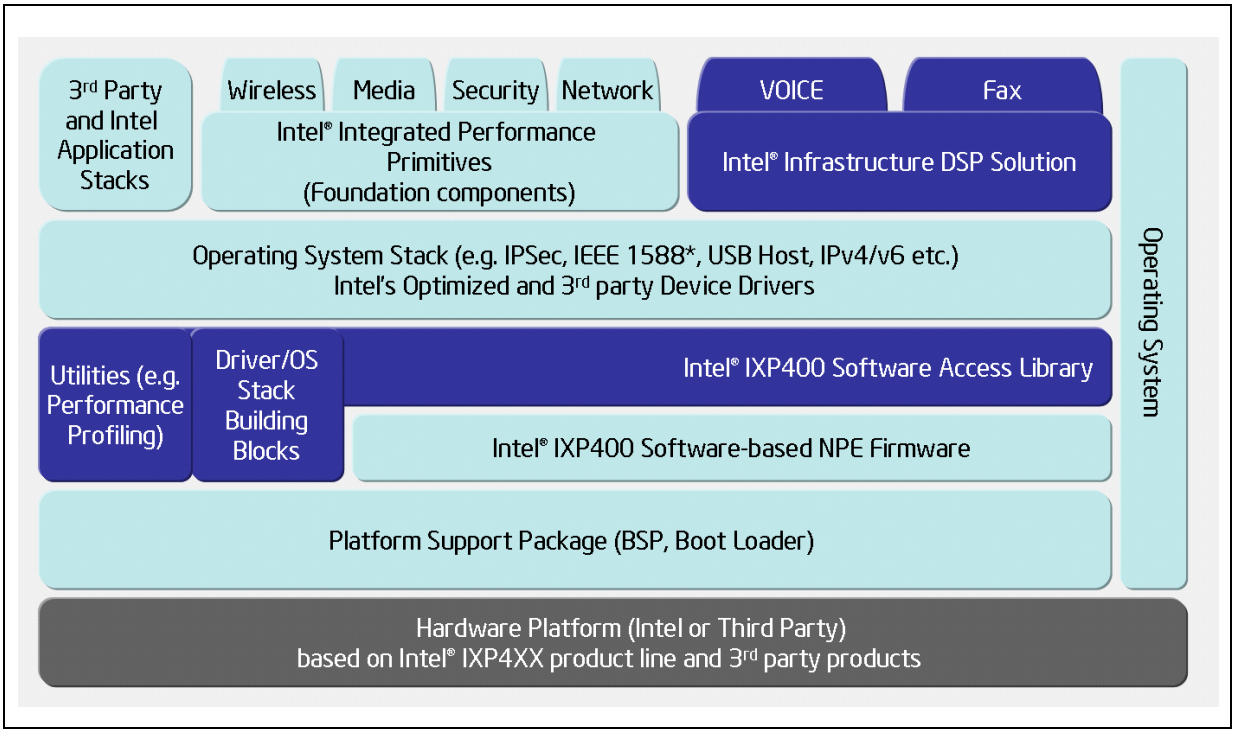


* Fax Services are not available in the Intel® Infrastructure DSP Solution v1.1

The Intel® Infrastructure DSP Solution currently supports the Intel® IXP4XX Product Line of Network Processors. The high level software block diagram are shown in the following sections.

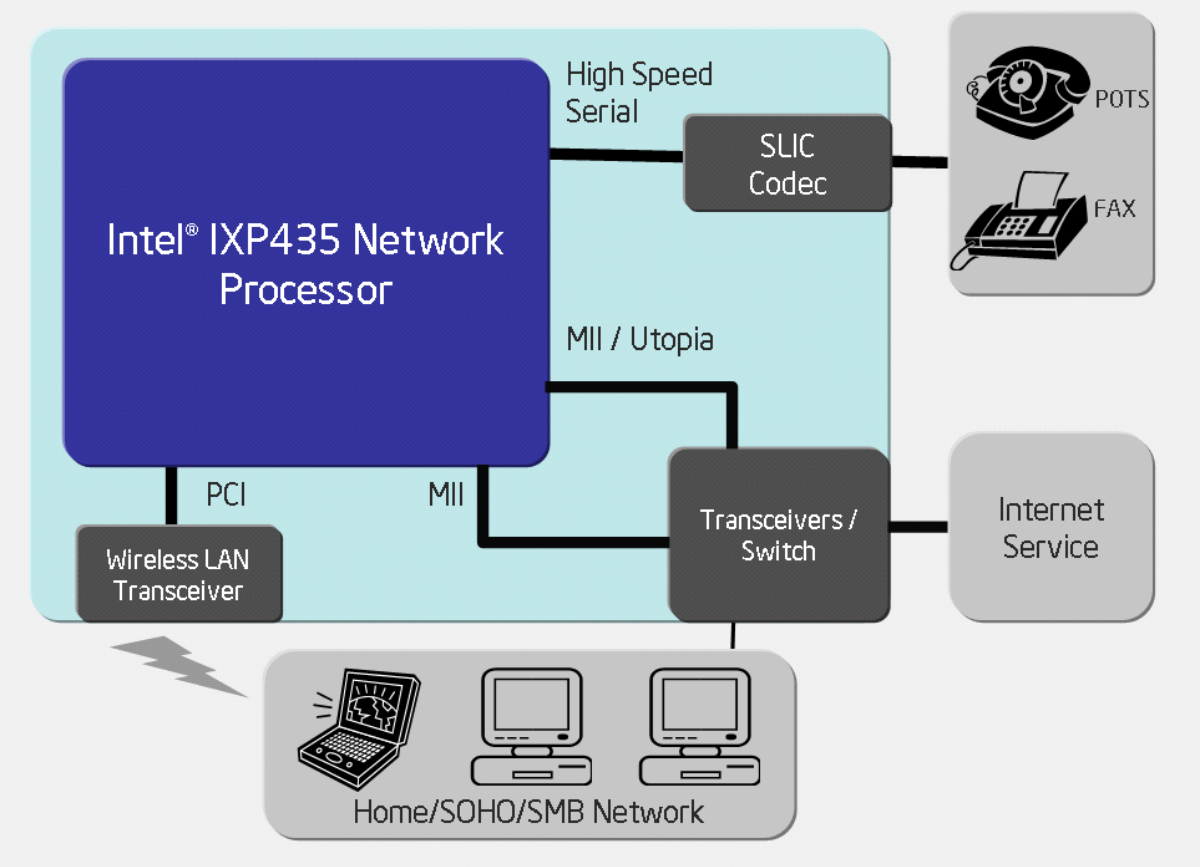
For the Intel® IXP4XX product line, the Intel® Infrastructure DSP Solution has environmental dependencies on the Intel® IXP400 Software Access Library. Figure 2 shows the various software stacks in a typical DSP solution.

Figure 2. Software Stacks on Intel® IXP4XX Product Line of Network Processors



A sample application using the Intel® Infrastructure DSP Solution can be as shown in Figure 3.

Figure 3. Sample Application Using Intel® Infrastructure DSP Solution



2.0 Supported Environments

This section outlines the supported environments in various versions of the Intel® Infrastructure DSP Solution:

Supported Environments	Version 1.1	Version 1.2
Processor		
Intel® IXP42X product line	Yes	No
Intel® IXP43X product line	Yes	Yes
Intel® IXP465 and IXP455 network processors	Yes	Yes
Operating Systems		
Linux* Kernel 2.6.16	Yes	No
Linux* Kernel 2.6.20	No	Yes
Tool Chains		
GCC version	3.4.1	3.4.1

Supported Environments	Version 1.1	Version 1.2
GlibC version	2.3.3	2.3.3
BinUtils version	2.15.94	2.15.94
Hardware Platforms		
Intel® IXDPG425 Network Gateway Reference Platform	Yes	No
Intel® IXP435 Multi-Service Residential Gateway Reference Platform	Yes	Yes
Intel® IXDP465 Development Platform	Yes	Yes
Access Library Versions		
Intel® IXP400 Software Access Library Version 2.4	Yes	No
Intel® IXP400 Software Access Library Version 3.0	No	Yes

3.0 Features

The Intel® Infrastructure DSP Solution has the following packages, which can be downloaded from Intel's website:

- Intel® Infrastructure DSP Solution – Foundation Library
- Intel® Infrastructure DSP Solution – Codec Library
- Intel® Infrastructure DSP Solution – Codelets (Example applications)
- Intel® Infrastructure DSP Solution – HSS driver
- Intel® Infrastructure DSP Solution – SLIC driver

3.1 Intel® Infrastructure DSP Solution – Foundation Library

The foundation library of the Intel® Infrastructure DSP Solution supports the following features:

Features Supported	Version 1.1	Version 1.2
Integrated speech CODEC		
G.711 a/u law	Yes	Yes
Pluggable speech CODEC		
G.722	Yes	Yes
G.723.1	Yes	Yes
G.726	Yes	Yes
G.729 a/b	Yes	Yes
G.729.1	No	Yes
iLBC	No	Yes
T.38 Fax with V.17, V.27, V.29	No	Yes
Other Pluggable Functionalities		
Line Echo Canceller	Yes	Yes
Telephony Features		
DTMF Generator and Detector	Yes	Yes

Features Supported	Version 1.1	Version 1.2
Tone Generator and Detector (Configurable)	Yes	Yes
Fax Tones detection (CNG, CED & T.30 preample) and Tone disabler support	Yes	Yes
FSK (v.23, Bellcore) for CallerID Generator and Detector	Yes	Yes
Three-way Conferencing	Yes (up to 4 instances)	Yes (up to 4 instances)
Low Latency Voice Bypass (using TDM timeslot switching)	Yes	Yes
Adaptive Jitter Buffer (max 500ms)	Yes	Yes
AGC/ALC (Automatic Gain / Level Control)	Yes	Yes
Voice Activity Detection (VAD)	Yes	Yes
Comfort Noise Generator (CNG)	Yes	Yes
DTMF over IP (RFC 2833)	Yes	Yes
Configurable Lip-synchronization delay	Yes	Yes
Number of voice channels supported	8	Yes
Other Features		
Audio player: playback of G.711 and G.729 encoded format	Yes	Yes
Configurable PCM modes: Narrowband and Wideband mode	Yes	Yes

Note: The Line Echo Canceller (LEC) is a pluggable component and can be selected for use during the build time; It can also be replaced with compatible third party LEC. The features of LEC include:

- Tail length of up to 128ms for narrow band signal
- Tail length of up to 64ms for wide band signal
- Non Linear processing (NLP)

3.2 Intel® Infrastructure DSP Solution – Codec Library

The codec library includes optimized implementation of the industry-standard build-time pluggable, narrow-band and wide-band VoIP codec. The following table provides the features of the supported codecs.

Codec	Supported Features	Version 1.1	Version 1.2
G.711 a/u law	• Fully bit-exact compliance with ITU-T G.711 • 64 bps • µ-law OR A-law • Packet Loss Concealment (PLC) • Discontinuous transmission support (DTX) using Voice Activity Detection (VAD) and Comfort Noise Generation (CNG)	Yes	Yes
G.722	• Fully bit-exact compliance with ITU-T G.722 • Packet Loss Concealment (PLC)	Yes	Yes
G.723.1	• Fully bit-exact compliance with ITU-T G.723.1 • 5.3 and 6.3 Kbps encoded bit stream rates • Discontinuous transmission support (DTX) using Voice Activity Detection (VAD) and Comfort Noise Generation (CNG)	Yes	Yes
G.726	• Fully bit-exact compliance with ITU-T G.726 • 16, 24, 32 or 40 Kbps bit stream rate • Packet Loss Concealment (PLC)	Yes	Yes

Codec	Supported Features	Version 1.1	Version 1.2
G.729 a/b	• Fully bit-exact compliance with ITU-T G.729 a/b • 8 Kbps encoded bit stream rate • Discontinuous transmission support (DTX) using Voice Activity Detection (VAD) and Comfort Noise Generation (CNG)	Yes	Yes
G.729.1	• Fully bit-exact compliance with ITU-T G.729.1 • Supports wideband (50-7000 Hz) • Supports digital signal sampled at 16 KHz and 8 KHz • Supports 8-32 Kbps bit rates	No	Yes
iLBC	• Operates at 13.3 / 15.2 Kbps bitrate • Frame size 30 ms for 13.3 Kbps, and 20 ms for 15.2 Kbps	No	Yes
T.38	• Supports all features of Group 3 faxes, including Error Correction Mode (ECM) • Redundancy mechanism providing packet loss • V.17, V.27 and V.29 integratedprevention	No	Yes

3.3 Intel® Infrastructure DSP Solution – Codelets

- The Codelets (example code) provide a test framework for the functionalities available in the foundation library and codec library.

3.4 Intel® Infrastructure DSP Solution – HSS and SLIC Drivers

- The HSS driver provides an interface between the High Speed Serial ports on the Intel® IXP4XX product line.
- The reference SLIC driver supports Silicon Labs* ProSLIC* Si3210/15 Single-channel ProSLIC with DC-DC controllers.

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