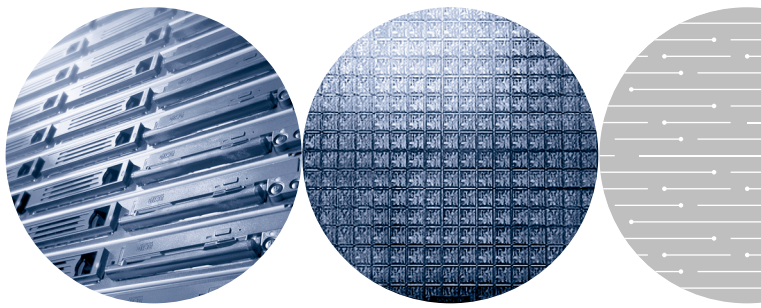
Application Note

Intel® NetStructure™ DM/V1200A

Call Control Performance Testing

Intel in Communications



Abstract

The Intel® NetStructure™ DM/V1200A multi-function resource board with Intel® Dialogic® System Release 6.0 software on CompactPCI* for the Linux* operating system was tested to ensure that it would achieve a call rate of one completed call every five seconds on all 120 channels simultaneously, and to ascertain its performance under “burst conditions.”

The DM/V1200A board was tested in a controlled environment using the Abacus* bulk call generator from Spirent Communications. The board achieved the required call rate of one completed call every five seconds on all 120 channels. These results represent a busy hour call attempt (BHCA) rate of 76,466 and a busy hour call completion (BHCC) rate of 99.8% when using the ml1_qs_net.pcd file that configures voice and media in separate clusters. During further testing, the board achieved a BHCA of 90,947 and a BHCC of 99.12% when receiving a call every 4.0 seconds, meeting and exceeding the call completion needs of the enterprise market segment.

Purpose

This application note characterizes the performance of the DM/V1200A board and documents the test results so that system designers and integrators can reduce platform-development time and risk. This note describes the test configurations, and is primarily geared toward aiding telephony platform system integrators and their system designers in building an enhanced programmable switching platform using the Intel building blocks referenced — chassis, boards, and the enabling software. Using the test configuration and performance results described in this application note, integrators and designers should be able to build similar, albeit customized, integrated switching and media processing platforms for use by application developers in designing complete end customer solutions such as enhanced programmable switches, integrated voice response (IVR), pre-paid, and voice messaging applications.

Test Environment

The following hardware and software components were used to conduct the system testing: one Intel® NetStructure™ ZT 5087 4U chassis containing an Intel® NetStructure™ ZT 5503 CPU board (using the 850 MHz Mobile Intel® Pentium® III processor with 512 MB of RAM) and running the Red Hat* 7.2 Linux operating system, kernel version 2.4.9-31. The chassis contained one DM/V1200A board, and was running System Release 6.0 on CompactPCI for the Linux operating system.

The Abacus bulk call generator was used to stimulate the DM/V1200A board with all channels performing simultaneous call control. Calls arrived and were terminated on all channels concurrently for more strenuous load testing. Testing parameters, as defined by Abacus, include:

- Call length — the precise duration of the call; the system starts clocking at call origination and stops at the disconnect
- Inter-call delay — the period of time between the end of one call on a channel and the beginning of another call on the same channel
- Total between calls – the sum of the call length plus the inter-call delay
- Call-to-call time – the maximum time between the start of one execution of the script on a channel and the start of the next execution of the script on the same channel during a test; applicable when call length plus inter-call delay does not equal total time between calls
- The formula used for deriving the BHCA — divide 3600 (the number of seconds in an hour) by the average call duration to find the total number of calls per channel; then multiply the result by 120 to find the number of calls handled per hour on the entire board
- The formula used for deriving the BHCC rate — divide the number of successfully completed calls by the BHCA and multiply by 100

Methodology

The DM/V1200A board was tested at a rate of one call every five seconds on all 120 ports simultaneously with the goal of achieving a BHCC over 99%. Once testing successfully reached the five-second interval, test engineers decided to continue testing the board at reduced time between call intervals to determine the breaking point (where the BHCC rate would fall below 90%).

The additional tests were conducted using multiple calling scenarios, with varying call lengths and the mandatory Abacus inter-call delay. Scenario one used a four-second call with a one-second inter-call delay for a total of five seconds between calls. Results for scenarios two through six are detailed in Figure 1.

Although the call length and inter-call delay in scenarios two through six did not equal the call intervals, calls were originated from the Abacus at the rate of one call every 4.0-5.0 seconds. During the remaining time the Abacus was idle, noted as the call-to-call time.

The test switching application, created internally, was configured to make the DM/V1200A board answer only incoming calls, and then hold the calls until the Abacus test equipment disconnected them. All timing and logging of the host board and system events were performed by the Abacus system.

The call completion percentage was derived from the number of call completions divided by the total call attempts. Abacus defines a call attempt as the number of times a number is dialed. If the test equipment goes off hook and a dial tone is not present, this is not considered a call attempt. Similarly, a call completion would indicate the number of calls answered by the called channel. For example, failed calls may have occurred because the Abacus bulk call generator was attempting to make a call but the DM/V1200A board was not ready to accept the incoming call, i.e., the board may have been busy tearing down previous call.

Detailed Findings

The DM/V1200A board not only met the requirement of supporting a call rate of one completed call every five seconds on all 120 ports simultaneously, but it also exceeded it, achieving a BHCC of 99.12% for calls placed every 4.0 seconds. This testing validates that the board will work as it was designed to, and can handle the scalability and density needs of the enterprise market segment.

The Abacus bulk call generator was used to stimulate the DM/V1200A board, with a new call generated every 5, 4.8, 4.6, 4.4, 4.2, and 4.0 seconds. Test results are listed in Figure 1 for each call interval tested.

Scenario	Call Length (Seconds)	Inter Call Delay (Seconds) Fixed Variable	Total Between Calls (Seconds)*	Average CPU Load	BHCA**	BHCC % Call Completion
1	3.0	2.0	5	2%	76446	99.80
2	3.0	1.0	4.8	2%	77838	98.65
3	3.0	1.0	4.6	2%	83277	98.71
4	3.0	1.0	4.4	2%	86073	99.75
5	3.0	1.0	4.2	2%	88421	99.20
6	3.0	1.0	4.0	2%	90947	99.12

*Call length plus inter-call delay does not always equal the total time; the Abacus test system is idle between calls.
** The BHCA results listed are less than the actual BHCA calculated numbers. The Abacus test system measured a call count for each independent channel. Not all channels achieved a 100% call count, lowering the total BHCA.

Figure 1: Results of the DMN160TEC with 120 Channels Under Stringent Testing

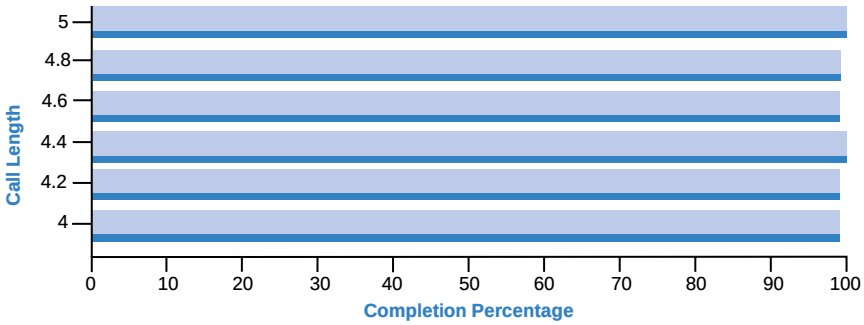


Figure 2: Call Completion Rate

Figure 2 illustrates the call completion rate of the DM/V1200A board when receiving 120 simultaneous calls from the Abacus test tool with various call intervals.

As indicated in Figure 2, the break point at which the BHCC rate fell below 99% was the point at which a call was placed every 4.0 seconds. At a time of 4.0 seconds between calls, the BHCC rate was 99.12%, a significantly lower call interval than the required five seconds and an acceptable rate for enterprise-grade systems.

Product List

Boards	Intel NetStructure DM/V1200A Multifunction Resource Board Intel NetStructure ZT 5503 System Master Processor Board using the 850 Mhz Mobile Intel Pentium III Processor
Chassis	Intel NetStructure ZT 5087 4U General Purpose Platform
Software	Intel Dialogic System Release 6.0 on Compact PCI for the Linux operating system
Operating system	RedHat 7.2 Linux, kernel version 2.4.9-31

Technical documentation is available at
http://resource.intel.com/telecom/support/documentation/releases/index.htm

For more information, contact your Intel account manager.

Glossary of Acronyms/Terms

BHCA	Busy hour call attempts
BHCC	Busy hour call completion
CPU	Central processing unit

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