Intel(R) Boot Agent for Gigabit

Version 1.1.15

Release Notes

10/31/02

1. Intel Boot Agent release 1.1.15 Release Notes

1.1   *Gigabit release - Build V1.0C0171 TIC 49448, Build date 10/31/02*

1.1.1   General

This release is designed for and tested on the Intel 82540EM, 82545EM & 82546EB family of Gigabit Ethernet LAN controllers, and is backwards compatible with the 82544 Gigabit Ethernet Controller family. It provides both PXE and RPL capabilities.   This image cannot be used for Intel Fast Ethernet LAN controllers – please use Intel Boot Agent for Fast Ethernet version 4.1.08 or above. The IBAutil Utility will handle this automatically for adapters, **but for LOM the CHGDEV utility must be used to update the Gigabit device ID to match the device ID programmed into the EEPROM before using these images. See section 1.1.5 for details.**

1.1.2   New Features in 1.1.x

More Diagnostics information on Setup Screen
Anytime the configuration setup menu is displayed, you may press the **D** key to display *diagnostics* information in the lower half of the screen. This information includes PWA (board ID), MAC address, I/O address, Memory address and Slot number, and can be helpful during interaction with Intel Support personnel or your IT team members. Once you press the **D** key, the information displayed remains until you leave the configuration setup screen (either by pressing **F4**, pressing the **Esc** key, or by rebooting the computer).

Continuous retry mode
In a scenario where both PXE client and server are booting at the same time (for instance after the resumption of supply following a power outage) it is not uncommon for the client to attempt to connect to the server and timeout as the server is still booting. In this case, the user is prompted to hit a key to retry. However, if the system is unattended, or designed for use without keyboard or monitor, then the boot process cannot easily be completed. Version 1.1.04 of the Intel Boot Agent adds an unadvertised feature – the ability to continuously retry until the server becomes available. Contact your Intel technical support contact for details if you need to use this feature.

Fast Boot detection
Microsoft has defined a 'simple boot flag'. If the BIOS supports this flag, it will take the shortest possible route when booting the system. All non-essential activities, such as testing memory, are bypassed in this mode. Intel Boot Agent version 1.1.04 is able to scan the BIOS ACPI tables to access this flag.
If the flag is found, and the diagnostics bit is not set, the Boot Agent will bypass the 2, 3 or 5 second delay that can be set to give the user time to access the preboot setup screen. In this case, the boot process acts as though the delay is set to 0 seconds (all initialization strings are suppressed, even if they are enabled).
If the flag is found and the diagnostics bit is set, or if the flag is not found, the Boot Agent will provide the 0, 2, 3, or 5 second delay as set in the EEPROM to allow users to access the setup screen.
Users wishing to access this setup screen should be directed to disable fast booting in the BIOS. More details about the simple boot flag can be found at
http://www.microsoft.com/hwdev/resources/specs/simp_bios.asp

1.1.3   Known Issues

Under investigation - The code in release 1.1.06 and later was improved to make the handling of fragmented UDP packets more robust. Under certain circumstances, Windows 2000 RIS would fail to complete when connected at 10Mbps. Whilst this code change has resolved this issue in the vast majority of cases, occasional problems have been observed with the 82545 LAN controller when running at 10Mbps only. Developers are investigating this issue. Workaround is to use 100Mbps or Gigabit connections.

- Upgrading Microsoft Windows 2000 Remote Installation Service (RIS) to include new drivers requires additional updates to the RIS server. With an unpatched RIS installation, the RIS INF parser will fail to match the new device ID to an INF on the server. This occurs even after updating the server according to the Microsoft Knowledge base article on this topic (Q246184). As an interim solution, Intel found an INF workaround for some Gigabit adapters, but this new INF cannot be included in the regular driver release, as it does not the pass Microsoft INF checker. The updated INFs are available from the Intel Support web site. Microsoft has confirmed this issue and posted a knowledge base article (Q315074) with information about obtaining a patch from Microsoft for this.

- Customers may notice the link light turning on and off during the PC boot cycle. The link light turns off at (approximately) PXE initialization. This is normal behavior. The link light then turns back on when the drivers are loaded for it. This driver can be the UNDI driver loaded by the Intel Boot Agent, or the network driver loaded by an operating system.

- Legacy free PCs: Intel has investigated a boot failure with platforms that do not have a floppy disk drive installed. In some scenarios, the diskette image fails to load from the PXE server when using a Windows 98 or Windows 95 boot image. Intel has not seen any failures booting with a DOS 6.22 boot image. The issue has been traced to the Network Bootstrap Program downloaded from the Intel PXE server included in the Intel IAL PXE PDK. This issue would likely affect other PXE servers based on that same toolkit. To work around this, either use DOS 6.22 formatted floppy images, or contact your commercial PXE vendor for an updated Network Bootstrap Program.

1.1.4   Fixed Issues

- 1.1.15 fixes a rare condition where valid UDP packets might be discarded erroneously. This only happened when:-
  - an application program is listening for UDP packets addressed to a specific port, but not to a specific IP address;
  - the application provides a buffer for the UDP code to store the destination IP in when a packet is successfully received;
  - on entry to the UDP read code, multiple UDP packets are queued in the UNDI driver, including the packet the application wants to read;
  - the application's packet is not at the head of the queue;
  - at least one of these UDP packets before the application's has a destination IP address that is not the client's IP address (such as a broadcast address) and whose port is not the port the application is listening for.

- Additionally 1.1.15 reduces memory size for the UNDI driver at runtime, by reducing the size and number of receive buffers from 32KB (16x2KB) to 12KB (8x1.5KB), fixes an EEPROM timing issue and preserves keystrokes in the keyboard buffer when scanning for 'control-s' used to enter the setup screen.

- Boot Agent versions earlier than 1.1.12 incorrectly calculated the MAC address of the second port of an 82546 based adapter or LOM implementation if the MAC address of the first port was odd. This has been fixed.

- Improved EEPROM robustness. EEPROM algorithms matched to 10/100 Boot Agent. Ensured system interrupts are disabled during EEPROM loading to prevent critical timing from being disrupted. Also increased the loop values for REQ/GRANT to allow for longer TCO windows.

- Boot Agent versions earlier than 1.1.09 incorrectly reported media failure on some slow networking connections. Version 1.1.09 of the Gigabit Boot Agent will wait for valid link detection for up to 6 seconds now (up from 2 seconds).

- Extra validation code added to check that Microsoft Simple Boot Flag ACPI table is valid before use. Also a minor formatting change was made to the GUID display, to align with Microsoft's wire format description of the GUID.

- The code in release 1.1.06 has been improved to make the handling of fragmented UDP packets more robust. Under certain circumstances, Windows 2000 RIS would fail to complete when connected at 10Mbps. Additionally, DHCP timeouts have been increased to cope with non-optimized networks, and the Boot Agent now has better handling of referrals between PXE servers.

- In release 1.1.04 the Flash address scan code wasn't correctly adjusting for a LOM image. If the Flash address returned all 0's, the 1.1.04 code would default to a basic 'safe' configuration with poorer performance. This was only an issue for LOMs, not a problem for the NIC image, and has been addressed in release 1.1.06.

- Certain types of DHCP servers may supply boot file names that are not terminated in a null character. Intel Boot Agent 1.0.15 included code from Intel Architecture Labs PXE 2.1 build 83. Build 83 was updated to address these non-terminated boot file names, but fails to work correctly if the DHCP boot file size option is not present. The boot file name is received, a pointer placed on the stack to point to this string to allow the null character to be appended. An extra TFTP request is made to retrieve the file size of the boot file. Unfortunately, the pointer is then destroyed before the boot file can be retrieved using TFTP. This issue has been corrected in Intel Boot Agent 1.1.04 and later. This scenario can be avoided entirely by running a PXE server or by using the boot file field rather than the DHCP boot file field. Customers using IBA 1.0.15 and running into this issue can also work around it by setting DHCP boot file size tag 13 as a non-zero value (ideally the size of the boot file).

1.1.5   Important – Chgdev tool must be used before code can be integrated.

The binary images supplied as part of this release are coded with a non-specific device ID. Intel 82544 Gigabit LOM devices use device IDs 1008h or 100Dh (as programmed in the EEPROM). The CHGDEV.EXE utility (CHanGe DEVice ID) must be run against the selected image, in order to change the PCI Header to the correct device ID. See Chgdev.txt for usage details.

Device ID	Product
1008	Intel® PRO/1000 XT Server Adapter
1008	Intel® 82544EI Based Network Connection
1009	Intel® PRO/1000 XF Server Adapter
100C	Intel® PRO/1000 T Desktop Adapter
100D	Intel® 82544GC Based Network Connection
100E	Intel® 82540EM Based Network Connection
100F	Intel® 82545EM Based Network Connection
1010	Intel® 82546EB Based Network Connection
1016	Intel® PRO/1000 MT Mobile Connection
1017	Intel® PRO/1000 MT Mobile Connection

101E	Intel® PRO/1000 MT Mobile Connection

1.1.6   Split ROM

Intel Boot Agent is available for split ROM implementations for BIOS integration. OEMs should work with their BIOS vendors to ensure that their BIOS implementations support Split ROM architecture. Monolithic implementations will continue to be supplied for adapter implementations. OEMs with specific implementation requirements should contact their technical representatives to discuss possible support options.

1.1.7   Decoder Ring

File name	Description
BA11**bb**M2.NIC	The PRO/1000 adapter monolithic boot agent image (with PXE and RPL support) for programming into adapter flash memory. '**bb**' is the build number.
BA11**bb**M2.FLB	The PRO/1000 boot agent flash image (with PXE and RPL support) in the FLB format for updating the flash using PROSet. '**bb**' is the build number.
BA11**bb**M2.LOM	The PRO/1000 adapter monolithic boot agent image (with PXE and RPL support) for programming into BIOS flash memory. '**bb**' is the build number.
BA11**bb**L2.LOM	The PRO/1000 adapter monolithic boot agent image (with PXE only support) for programming into BIOS flash memory. '**bb**' is the build number.
BA11**bb**S2.LOM	The PRO/1000 split boot agent image (UNDI only) with RPL support for programming into BIOS flash memory. '**bb**' is the build number.
BA11**bb**T2.LOM	The PRO/1000 split boot agent image (with UNDI support only) for programming into BIOS flash memory. '**bb**' is the build number.
BA11**bb**BC.LOM	The split boot agent Base Code image for programming into BIOS flash memory. '**bb**' is the build number.

1.1.8   EEPROM Contents

1.1.8.1   Gigabit Main Setup Options (Word 30h)

The configuration of the software is controlled by EEPROM on the adapter. The main setup options are stored in word 30h. These options are those that can be changed by the user via the Control-S setup menu or by using the IBAcfg.exe utility. Word 30h has the following format:

BIT(S)	Name	Function
15	PPB	PXE Presence Bit – 0 Indicates that the image in the flash contains a PXE image. 1 indicates that no PXE image is contained. Default is 0 in order to be backwards compatible with units already in the field. If this bit is set to 0, EEPROM word 32h (PXE Version) is valid. When EPB is set to 1 and this bit is set to 0, it means both images are present in the flash.
14	EPB	EFI Presence Bit – 1 Indicates that the image in the flash contains an EFI image. 0 indicates that no EFI image is contained. Default is 0 in order to be backwards compatible with units already in the field. . If this bit is set to 1, EEPROM word 33h (EFI Version) is valid. When PPB is set to 0 and this bit is set to 1, it means both images (P XE and EFI) images are present in the flash.
13	RFU	Reserved. Must be 0.
12	FDP	Bit 12 will mean Force Full duplex. Bit 12 is meaningless unless 10 and 11 are set. 0 means Half Duplex, 1 means Full Duplex.
11-10	FSP	Bits 10 and 11 make the speed. 01b = 10Mbs, 10b = 100Mbs, 11b = Not allowed Bit 12 is meaningless unless 10 and 11 are set. All zeros means Auto-negotiate (the current bit state).
9	LWS	Legacy OS Wakeup Support. (For 82559-based adapters only) If set to 1, the agent will enable PME in the adapter's PCI configuration space during initialization. This allows remote wakeup under legacy operating systems that don't normally support it. Note that enabling this makes the adapter technically non-compliant with the ACPI specification, which is why the default is disabled. 0 = Disabled (Default Value) 1 = Enabled
8	DSM	Display Setup Message. If the bit is set to 1, the "Press Control-S" message is displayed after the title message. Default value is 1.
7- 6	PT	Prompt Time. These bits control how long the "Press Control-S" setup prompt message is displayed, if enabled by DIM. 00 = 2 seconds (default) 01 = 3 seconds 10 = 5 seconds 11 = 0 seconds Note: The Ctrl-S message is not displayed if 0 seconds prompt time is selected.
5	LBS	Local Boot Selection. *OBSOLETE.* In previous versions of the agent, this bit enables or disables local boot, if the DBS bit selects it. Default value is 1 to enable local booting. **The boot agent at runtime does not use this bit any more.**
4–3	DBS	Default Boot Selection. These bits select which device is the default boot device. These bits are only used if the agent detects that the BIOS does not support boot order selection or if the MODE field of word 31h is set to MODE_LEGACY. 00 = Network boot, then local boot 01 = Local boot, then network boot 10 = Network boot only 11 = Local boot only

BIT(S)	Name	Function
2	BBS	BIOS Boot Specification. ***OBSOLETE.*** In previous versions of the agent, this bit enables or disables use of the BBS to determine boot order. If set to 1, the BIOS boot order is used, and the DBS bits are ignored. **The boot agent at runtime does not use this bit any more.** The runtime checks for BBS/PnP and the setting in the MODE field of word 31h are used instead..
1-0	PS	Protocol Select. These bits select the boot protocol. 00 = PXE (default value) 01 = RPL protocol. Other values are undefined

1.1.8.2   Gigabit Configuration Customization Options (Word 31h)

Word 31h of the EEPROM contains settings that can be programmed by an OEM or network administrator to customize the operation of the software. These settings cannot be changed from within the Control-S setup menu. The lower byte contains settings that would typically be configured by a network administrator using the IBAUtil.exe utility; these settings generally control which setup menu options are changeable. The upper byte are generally settings that would be used by an OEM to control the operation of the agent in a LOM environment, although there is nothing in the agent to prevent their use on a NIC implementation. Word 31h has the following format:

BIT(S)	Name	Function
15 - 14	SIG	Signature. Must be set to **01** to indicate that the agent or other configuration software has programmed this word.
13	RFU	Reserved. Must be 0.
12	RFU	Reserved. Must be 0.
11	RFU	Reserved. Must be 0.
10-8	MODE	Selects the agent's boot order setup mode. This field changes the agent's default behavior in order to make it compatible with systems that do not completely support the BBS and PnP Expansion ROM standards. Valid values and their meanings are: 000 b Normal behavior. The agent will attempt to detect BBS and PnP Expansion ROM support as it normally does. 001 b Force Legacy mode. The agent will not attempt to detect BBS or PnP Expansion ROM supports in the BIOS and will assume the BIOS is not compliant. The user can change the BIOS boot order in the Setup Menu. 010 b Force BBS mode. The agent will assume the BIOS is BBS-compliant, even though it may not be detected as such by the agent's detection code. The user can NOT change the BIOS boot order in the Setup Menu. 011 b Force PnP Int18 mode. The agent will assume the BIOS allows boot order setup for PnP Expansion ROMs and will hook interrupt 18h (to inform the BIOS that the agent is a bootable device) in addition to registering as a BBS IPL device. The user can NOT change the BIOS boot order in the Setup Menu.

		100 b Force PnP Int19 mode. The agent will assume the BIOS allows boot order setup for PnP Expansion ROMs and will hook interrupt 19h (to inform the BIOS that the agent is a bootable device) in addition to registering as a BBS IPL device. The user can NOT change the BIOS boot order in the Setup Menu.
		101 b Reserved for future use. If specified, is treated as a value of 000b.
		110 b Reserved for future use. If specified, is treated as a value of 000b.
		111 b Reserved for future use. If specified, is treated as a value of 000b.
7	RFU	Reserved. Must be 0.
6	RFU	Reserved. Must be 0.
5	DFU	Disable Flash Update. If this bit is set to 1, the user is not allowed to update the flash image using PROSet. Default value is 0.
4	DLWS	Disable Legacy Wakeup Support. If this bit is set to 1, the user is not allowed to change the Legacy OS Wakeup Support menu option. Default value is 0.
3	DBS	Disable Boot Selection. If this bit is set to 1, the user is not allowed to change the boot order menu option. Default value is 0.
2	DPS	Disable Protocol Select. If set to 1, the user is not allowed to change the boot protocol. Default value is 0.
1	DTM	Disable Title Message. If this bit is set to 1, the title message displaying the version of the Boot Agent is suppressed; the Control-S message is also suppressed. This is for OEMs who do not wish the boot agent to display any messages at system boot. Default value is 0.
0	DSM	Disable Setup Menu. If this bit is set to 1, the user is not allowed to invoke the setup menu by pressing Control-S. In this case, the EEPROM may only be changed via an external program. Default value is 0.

1.1.8.3   Gigabit Configuration Customization Options (Word 32h)

Word 32h of the EEPROM is used to store the version of the boot agent that is stored in the flash image. When the Boot Agent loads, it can check this value to determine if any first-time configuration needs to be performed. The agent then updates this word with its version. Some diagnostic tools to report the version of the Boot Agent in the flash also read this word. This word is only valid if the PPB is set to 0. Otherwise the contents may be undefined. The format of this word is:

BIT(S)	Name	Function
15 - 12	MAJ	PXE Boot Agent Major Version. Default value is 0
11 - 8	MIN	PXE Boot Agent Minor Version. Default value is 0
7 - 0	BLD	PXE Boot Agent Build Number. Default value is 0