EN (English)

Does RTL8153 Support PXE?

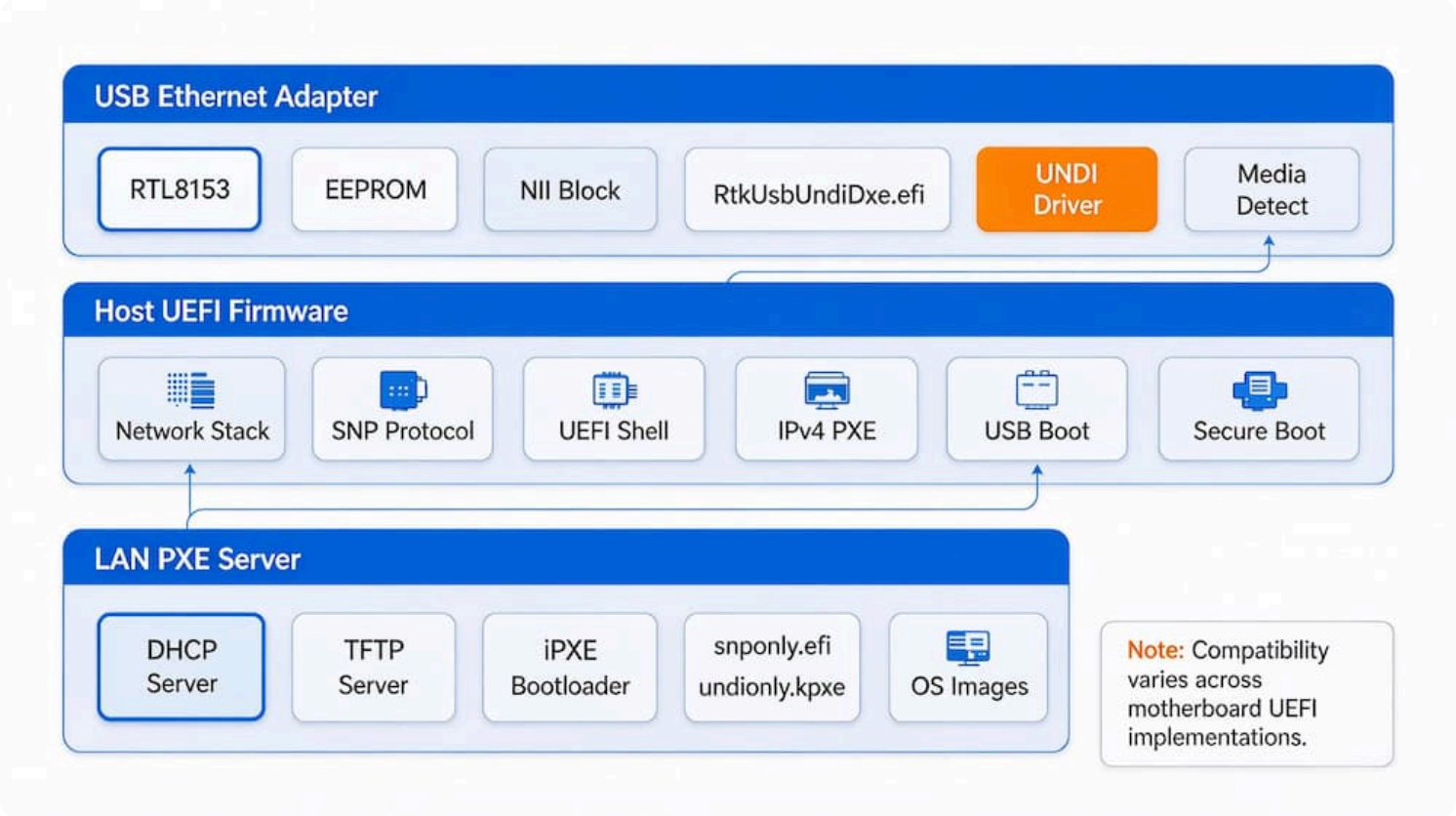


Figure: Layered architecture of PXE boot with RTL8153 USB Ethernet adapter

It is easy to misunderstand: Realtek providing the UEFI UNDI binary RtkUsbUndiDxe.efi does **not** mean the USB adapter works for PXE boot straight out of the box. The chip only supplies the low-level driver. Functional PXE requires three parts to work together:

the USB adapter, host motherboard UEFI, and a LAN PXE server.

Adapter and firmware work (factory side, most critical)

Most standard RTL8153 adapters omit external EEPROM/Flash and lack the NII (Network Interface Identifier) structure defined by the UEFI Forum. NII carries UNDI driver info, device ID, MAC and link detection data, so the motherboard UEFI can identify it as a bootable network device. Without NII, PXE recognition fails.

Engineers need to package RtkUsbUndiDxe.efi, NII settings, VID/PID, MAC and PHY parameters, then flash the firmware to the on-board EEPROM. Separate driver builds for x64, ARM and 32-bit platforms are required, and media detect must be enabled to track link status.

The UEFI USB stack is fragile. Firmware tuning for USB enumeration, delays and reset sequences is often needed. If Secure Boot is active, the EFI driver must be signed; unsigned drivers will be blocked. Unlike PCI NICs using Option ROM, USB Ethernet adapters use dynamic UEFI DXE loading with NII reporting. After integration, validation runs in UEFI Shell to confirm SNP (Simple Network Protocol), IP acquisition and normal packet transmission.

Host UEFI / BIOS configuration (customer side)

The customer needs to enable Network Stack, IPv4 PXE and USB Boot in UEFI. Thunderbolt devices require Thunderbolt boot support. Unsigned UNDI drivers need Secure Boot disabled. The network boot option should be added to the boot priority list. One common limitation: many older UEFI implementations have weak USB network stack support, so recognition may still fail even with correct adapter firmware.

LAN PXE server deployment (customer network side)

The adapter only enables pre-boot networking via DHCP and TFTP. The full PXE boot stack resides on the server. A DHCP server assigns IPs and points to the TFTP server and boot file. UEFI typically uses ipxe.efi / snponly.efi, while legacy boot uses

undionly.kpxe. The TFTP server hosts bootloaders and system images; iPXE calls the UEFI SNP/UNDI interface to pull OS installers, PE or diagnostic tools.

Simplified workflow

- Add EEPROM to the PCB, program NII and flash the matching RtkUsbUndiDxe.efi
- Tune USB enumeration and link detection, verify SNP connectivity in UEFI Shell
- Customer turns on Network Stack and USB network boot in UEFI
- Customer sets up DHCP + TFTP PXE server on the local network

Business note for Tittron CU006-A

Tittron standard CU006-A uses RTL8153 without EEPROM, NII or UNDI firmware. It does **not** support PXE by default. PXE-ready versions are available as an optional custom service, including hardware modification, firmware integration and cross-platform testing. Please note that UEFI implementations differ widely across motherboard brands; 100% universal compatibility cannot be guaranteed, and this should be noted in quotations.