



Wireless Software for Windows Desktop

Windows XP and Windows 7

Software Integration Guide
Version 1.1

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REVISION HISTORY

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INTRODUCTION

This guide describes how to integrate Laird wireless software for Windows Desktop operating systems. You must obtain the Laird Windows Desktop software suite from Laird support and adhere to the guidance outlined in this document.

Obtaining Laird Software

The Windows Desktop software suite is only distributed as a Windows Installer (.msi) file for the specific desktop operating system.

The software suite may be obtained from Laird support. Contact ews-support@lairdtech.com and be prepared to provide the following information:

- Your version of Windows Desktop. For example: XP, Win 7, Win 8
- Your platform's CPU architecture. For example: x86 or x64
- Your radio module series. For example: 10 Series (specify CF or SD) or 15 Series

INSTALL PACKAGE

The content of the Windows installer package varies for each operating system. This section describes the main content, any requirements, and selectable features. We assume you are familiar with Microsoft's installer technology.

Windows XP Specifics

The following points summarize the Windows XP installer specifics:

- Supports the 32-bit operating system.
- Contains one main feature which installs all Laird software including the NDIS5 device driver, Laird supplicant, and connection utilities.
- The Windows XP installer does not support upgrades; the existing installed software must be fully removed before installing newer software.

Windows 7 Specifics

The following points summarize the Windows 7 installer specifics:

- Supports both 32- and 64-bit Windows operating systems.
- Contains three selectable features:
 - **DRV** – The NDIS6 device driver.
 - **APP** – The Laird software necessary to make a wireless connection (e.g. LCM and Laird 802.1x supplicant).
 - **EAP** – The Cisco CCX EAP-Host Plugins (LEAP, PEAP-GTC, and EAP-FAST) for use with the Windows Native Connection Manager and 802.1x supplicants.

Windows provides several ways to select these features such as install transforms or public properties (e.g., INSTALLLEVEL or ADDLOCAL).

- The Windows 7 installer supports seamless upgrades; it does not require the existing software to be removed, which results in existing profile settings being preserved.

Note: Selecting the APP or EAP feature automatically selects and installs the NDIS6 device driver.

SDK

An SDK library is available to Laird customers for the creation of custom applications for integration into their products. Prior to the Windows 7 NDIS6 release, this SDK only supported 32-bit NDIS5 device drivers. With the release of the NDIS6 device driver, this SDK is enhanced to include support for both NDIS5 and NDIS6, as well as 32- and 64-bit Windows operating systems.

Note: Existing applications must link against this new SDK library in order to obtain support for NDIS6 device drivers.

64-Bit Support

64-bit support is limited to Windows 7 and newer operating systems.

Administrative Privilege Requirement

By default, Windows 7 runs all applications in a least privilege mode, while the Laird software configuration repository requires administrative write privileges. Consequently, the Laird connection manager or any application using the Laird SDK to create, modify, or delete profiles must be run with elevated (administrative) privileges.

Microsoft OIDs

With the introduction of NDIS6, Microsoft radically changes the set of OIDs a device driver is required to support. Consequently, any application which was making direct OID calls to the Laird device driver must be modified to incorporate these new OIDs. As a general guideline, all NDIS5 OIDs start with the name OID_802_11, while the NDIS6 OIDs start with OID_DOT11. Rather than making direct calls to the driver, an application writer may want to use the Microsoft WLAN APIs instead which are layered on top of the NDIS6 device driver. Doing so should provide some level of future proof if Microsoft should decide to change the OID set the driver is required to support in the future.

SUPPORTED FEATURES

This section lists the features supported by the Laird device driver.

NDIS5 and NDIS6 Device Drivers

- CCX – Full and OFF
- Interference mode
- 5 GHz outdoor and channel masks
- Radio mode
- Ad hoc mode
- DFS channels – On and Off
- NULL SSID profiles
- Roam settings – Trigger, Period, and Delta
- Regulatory domains – FCC, WW, ETSI, KCC, MIC (formerly TELEC)
- Authentications – Open, Static WEP, Dynamic WEP, WPA/2, WPA/2-PSK, CCKM
- Ciphers – WEP, TKIP, AES
- EAP methods – LEAP, PEAP, EAP-FAST, EAP-TLS, EAP-TTLS
- 2.4 channel subset
- Antenna power attenuation
- Tx power

- Power Save – CAM, FAST, MAX
- WME
- TX/RX antenna selection

NDIS6 Specific

- CCX Optimized
- CCKM with CCX disabled
- DFS dwell time
- 5 GHz channel subset
- Auto profile selection
- 64-bit operating systems
- Full integration with Windows Wireless LAN Services

DEPRECATED FEATURES

The following features have been deprecated in the NDIS6 device driver:

- 802.11 LEAP authentication. The driver no longer supports 802.11 LEAP authentication. You should use 802.11 open authentication instead.

Note: This does **not** refer to 802.1x LEAP authentication, but rather the low level 802.11 protocol authentication which occurs before 802.11 association.

- 802.11 Shared Key Authentication.
- CKIP Encryption

CONFIGURATION

There are several ways in which to configure the device driver with settings that expand across all network profiles.

Laird Software Global Settings

The Laird Global Settings repository can be used to configure settings which apply to all network configurations (e.g., regulatory domains). These settings may be configured using the Laird Connection Manager (LCM), by modifying the Windows Installer's registry table, or using some other 3rd party method (e.g., registry file). The global settings repository exists under the Windows registry, specifically under:

HKLM\CurrentControlSet\Services\SDC_CFP\Params\Configs\GlobalConfig and applies to all instances of the device driver.

Device Advanced Tab Settings

For deployments which make use of the Windows native connection manager and supplicant, the device driver may be configured using the Windows Advanced Tab user interface. This UI allows for the setting of certain information per device instance, rather than all instances like the Laird global settings repository.

Setting Regulatory Domain with Advanced Tab

The regulatory domain configuration is not brought out to the Advanced Tab settings UI to minimize. The regulatory domain settings can be found under the following registry hive, **HKLM\CurrentControlSet\Control\Class\{4D36E972-E325-11CE-BFC1-08002BE10318}\<device instance>**. The <device instance> is a positive number which

varies from system to system as it depends on the number and order that network devices are installed. The specific registry key is Country which contains a two-character country code depending on the regulatory domain being configured.

Regulatory Domain	Country Value
World Mode (default)	X2
FCC	US
ETSI	DE
MIC	JP
KCC	KR

Configuration Precedence:

Whenever a setting is found under both the Laird Global Setting and the Device Advanced Tab settings, the Laird Global Setting always takes precedence and overrides the setting found under Device Advanced Tab settings.

WINDOWS NATIVE WI-FI ARCHITECTURE

Microsoft WLAN APIs

Windows 7 includes a set of wireless APIs fully supported by the Laird NDIS6 device driver. These APIs can be used to obtain status and configuration information or to manage the wireless adapter when the LCM is not present or configured for 3rd party supplicant mode.

More information can be found on Microsoft's website:

[http://msdn.microsoft.com/en-us/library/windows/desktop/ms706274\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/ms706274(v=vs.85).aspx)

Native Profiles

Windows 7 defines a set of XML profile elements which can be used with the Windows Native Connection Manager to aid in the configuration of the wireless adapter. These profiles can be pushed out using Microsoft Group Policy.

Note: We recommend that native profiles only be deployed when the Windows native connection manager and supplicant is used to manage the wireless connection; otherwise they may interfere with the Laird Connection Management software. See the [Multiple Connection Managers](#) section for more information on the hazards of deploying both Laird and native profiles.

More information can be found on Microsoft's website:

[http://msdn.microsoft.com/en-us/library/windows/desktop/bb525370\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/bb525370(v=vs.85).aspx)

OTHER INFORMATION

Administrative Privilege

By default, Windows 7 runs all applications in a least privilege mode while the Laird software configuration repository requires administrative write privileges. Consequently, the LCM or any application using the Laird SDK to create, modify, or delete profiles must be run with elevated (administrative) privileges.

Multiple Connection Managers

With NDIS6 and Windows 7, Microsoft has made significant changes the wireless stack. The biggest change is that the device driver can no longer automatically make a network connection. Instead, the driver must wait for the connection manager to tell it to connect and it must disconnect and stay disconnected when the connection manager tells it to disconnect. To enforce this behavior, Microsoft introduced a native Wi-Fi driver which binds on top of all device drivers that advertise themselves as being 802.11 capable. This native Wi-Fi driver enforces certain wireless states (e.g., disconnection, connecting, connected) and prevents user applications from directly settings configuration information, such as the SSID. Consequently, the Laird Connection Service must work in conjunction with the native connection manager using the WLAN APIs; disabling it would lose most of the new features provided by Windows 7 (e.g., Net Monitor mode).

As a result of this architectural change, there may be multiple network connection managers, each trying to actively manage the wireless connection. If the LCM is configured to the Laird supplicant and a native profile is also configured and is set to auto-connect, or if the user connects using the native connection manager, it results in a disruption in the LCM connection because multiple connection managers are attempting to manage the same network adapter at the same time. Laird cannot prevent this from happening but if it occurs, the PE15N attempts to recover and re-establish the original connection.

Note: This assumes ACM invoked the connection attempt. How well LCM can recover when a connection attempt is invoked by a 3rd party connection manager depends largely on the behaviour of the 3rd party connection manager. In some cases, you may need to uninstall one of the connection managers.

Because of this, if network administrators must push out native wireless profiles via group policy, we recommend that they do **not** select *Connect automatically when this network is in range* or *Connect to a more preferred network if available*.