AN1372: Configuring OpenThread Applications for Thread 1.3

Thread 1.3 builds on Thread 1.1 and Thread 1.2's robust foundation. It defines enhancements and additions to the Thread Border Router definition, to enable bidirectional IPv6 connectivity, service discovery using DNS, and provide IPv4-backwards support using NAT. It includes support for Thread-over-infrastructure (non-802.15.4 IPv6) links. Finally, to remedy throughput concerns, the specification defines support for TCP as a standard component and protocol.

KEY POINTS

- Including Thread 1.3 features in SoC Applications
- Including Thread 1.3 features in an OpenThread Border Router

Note: Silicon Labs includes the OpenThread stack with the current default protocol version 1.3 (=4).

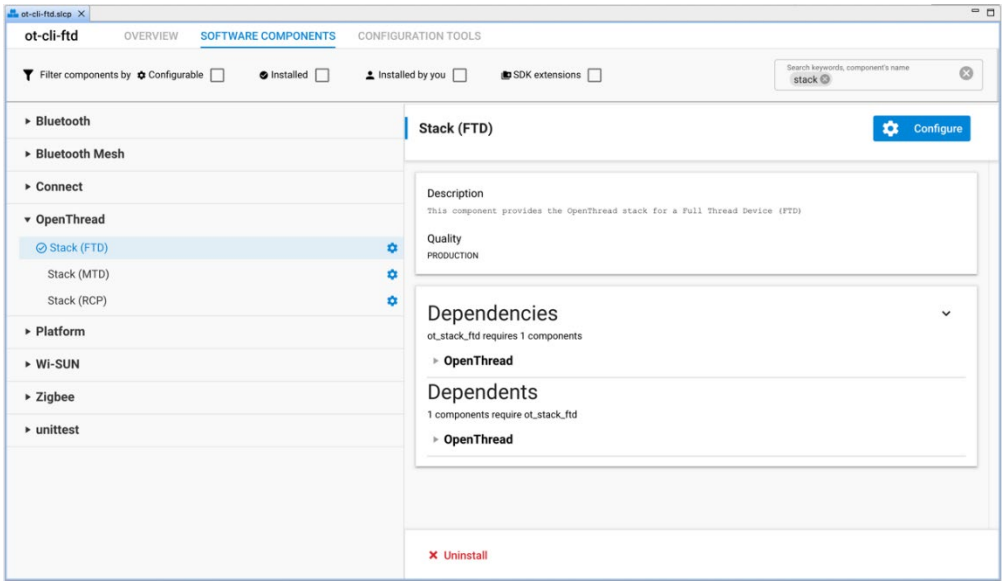
Silicon Labs provides components and configuration options that enable you to configure Thread 1.3 features with sample applications. These features are compatible with EFR32MG1x and EFR32MG2x SoCs, RCPs, and modules. This application note assumes you have a basic understanding of how Thread is implemented on EFR32 devices. For more information, see *UG103.11: Thread Fundamentals*.

1 Including Thread 1.3 features in SoC Applications

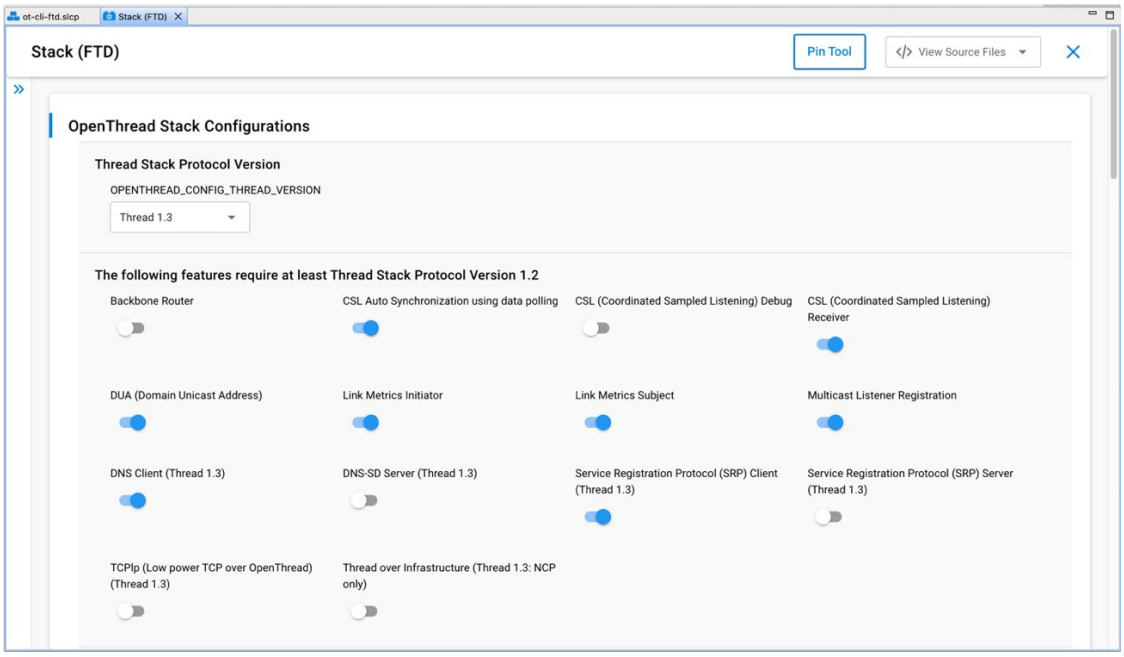
Silicon Labs provides a number of sample SoC OpenThread applications. You can modify these to include Thread 1.3 features (some of them are enabled by default). This chapter assumes you are familiar with creating and modifying OpenThread projects in Simplicity Studio 5. If you need more information, see the Simplicity Studio 5 User's Guide and *QSG170: Silicon Labs OpenThread Quick Start Guide*.

As an example, the following procedure shows how to configure 1.3 features:

1. Create a project based on the example: **OpenThread – SoC CLI (FTD)**.
2. On the **SOFTWARE COMPONENTS** tab, search for and select the **Stack (FTD)** entry. Depending on your application, you may have to do this on a **Stack (MTD)** or **Stack (RCP)** component (this example is for an FTD application).



3. Configure the various compile-time settings. The options are explained in the OpenThread documentation at https://github.com/open-thread/openthread/blob/main/examples/README.md.



For Thread 1.3 features, the following flags are required. The description for each flag indicates whether is mandatory, optional, or recommended. **Do not enable** these flags for a Thread 1.1 application.

- **Thread Stack Protocol Version**: Set to Thread 1.3 (mandatory).

- **DNS Client** (mandatory): Required for Thread 1.3 compliance.
- **DNS-SD Server** (recommended): FTDs only. Required for Thread 1.3 compliance on Thread Border Routers. Optional otherwise.
- **SRP Client** (mandatory): Required for Thread 1.3 compliance.
- **SRP Server** (recommended): FTDs only. Required for Thread 1.3 compliance on Thread Border Routers. Optional otherwise.
- **TCPlp (TCP low-power)** (optional): Not required for Thread 1.3 compliance; however, as a feature defined in Thread 1.3, this can be enabled to test the low power TCP feature.
- **Thread over Infrastructure** (recommended): NCPs only. Required for Thread 1.3 compliance on Thread Border Routers (and enabled by default for the border router POSIX stack). For sample applications on EFR platforms, this applies only to NCPs, and as such is an untested, experimental feature, as Silicon Labs does not directly support NCP applications.

Additional information about these features is included in the following table.

Table 1-1. Thread 1.3 Configuration Flags

Flag	Note
DNS Client (OPENTHREAD_CONFIG_DNS_CLIENT_ENABLE)	Enables support for DNS client. Enables sending DNS queries for AAAA (IPv6) records.
DNS-SD Server (OPENTHREAD_CONFIG_DNSSD_SERVER_ENABLE)	Enables support for DNS-SD server. Service information from a local SRP server is used to resolve DNS-SD queries. A DNS server should implement the following features: • DNS recursive resolver to answer queries for all valid DNS record types, including host name records, for example. DNS type "A" and "AAAA" address records. • DNS authoritative server that answers authoritatively for DNS-Based Service Discovery [RFC 6763] records and any other DNS records registered with the Thread Service Registry by clients using the Service Registration Protocol. • DNS Update Server: A server that accepts properly authenticated client requests to update authoritative DNS data.
SRP Client (OPENTHREAD_CONFIG_SRP_CLIENT_ENABLE)	Enables support for SRP (Service Registration Protocol) client. An SRP client Thread Device registers services with the SRP server, communicates with the corresponding DNS-SD authoritative server for queries, and uses the DNS recursive resolver for DNS resolution as defined by the respective IETF specifications. For more information, see: https://github.com/openthread/openthread/blob/main/src/cli/README_SRP_CLIENT.md
SRP Server (OPENTHREAD_CONFIG_SRP_SERVER_ENABLE)	Enables support for SRP (Service Registration Protocol) server. An SRP server supports the DNS Update Server functions, plus additional public key cryptography for security and some other minor enhancements to better support constrained clients. For more information, see: https://github.com/openthread/openthread/blob/main/src/cli/README_SRP.md
TCPlp (TCP Low Power) (OPENTHREAD_CONFIG_TCP_SERVER_ENABLE)	Enables the low-power TCP feature, as defined in the Thread 1.3 specification. This depends on the third-party tcplp library included in the openthread stack. For more information, see: https://github.com/openthread/openthread/blob/main/src/cli/README_TCP.md
Thread over Infrastructure (OPENTHREAD_CONFIG_RADIO_LINK_TREL_ENABLE)	Enables TREL radio link for Thread over Infrastructure feature. For sample applications, this is applicable to NCPs only, which are currently not supported by Silicon Labs. See the next section for information on how this applies to border router POSIX platforms.

2 Including Thread 1.3 features in an OpenThread Border Router

Silicon Labs provides several sample OpenThread RCP applications. By default, the RCP applications on supported Silicon Labs hardware automatically support Thread 1.3 features if they are present on the host (the Border Router, which is Silicon Labs' supported RCP model). None of the Thread 1.3 features are RCP-specific, so turning them on or off for the RCP sample application has no effect.

Refer to *AN1256: Using the Silicon Labs RCP with the OpenThread Border Router* for detailed instructions on how to build an OpenThread Border Router for Raspberry Pi 3B+ or above. You must use a Thread protocol version 1.3 RCP with a Border Router that is also running a stack at protocol version 1.3.

Thread 1.3 features can be enabled on the border router separately, by making sure the POSIX stack enables the following CMake flags. These flags are enabled by default with the current default OpenThread Border Router offering. (See Table 1-1. Thread 1.3 Configuration Flags for more information on their purpose.)

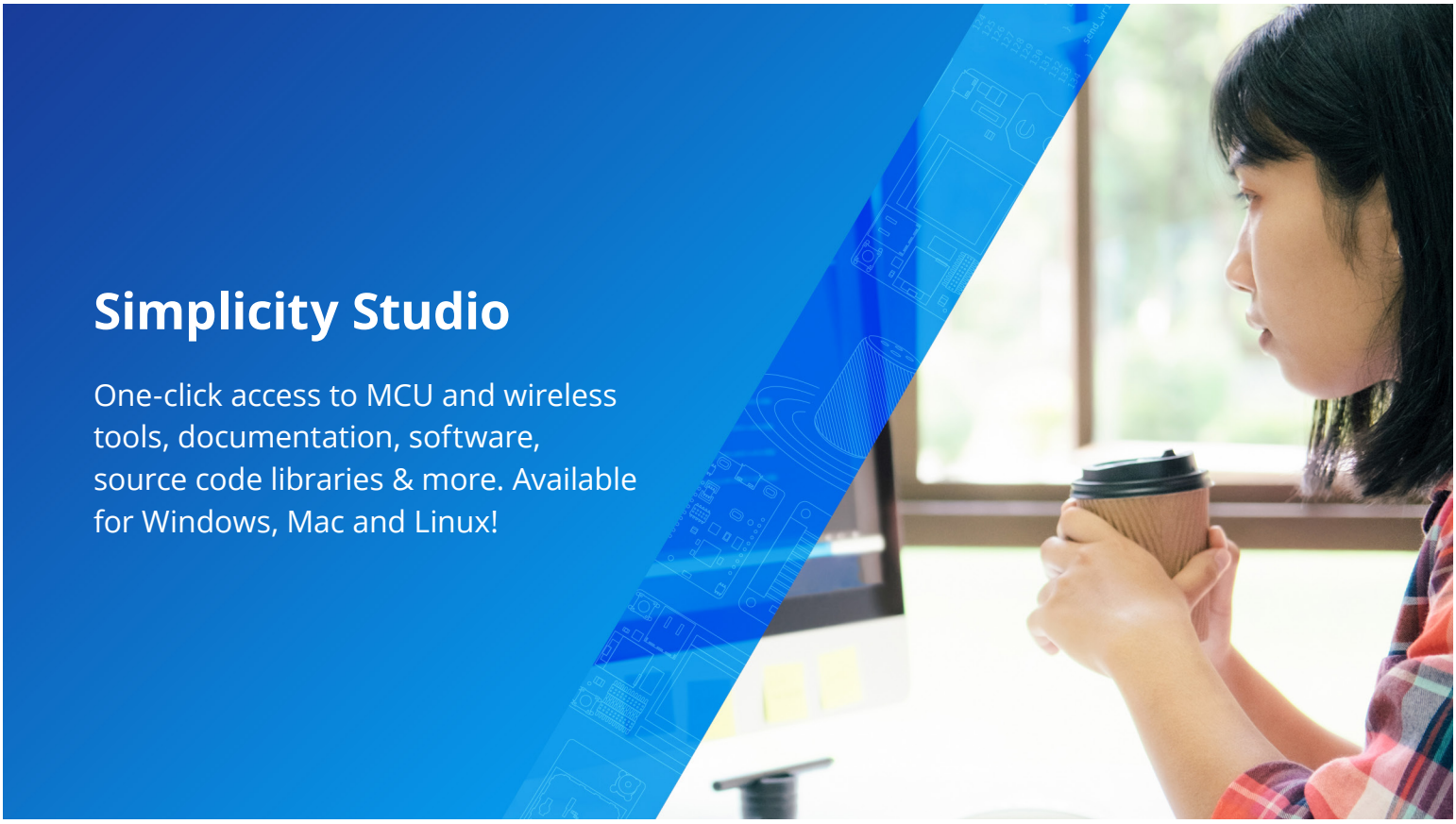
Table 2-1. Border Router CMake Mappings

CMake Flag	Thread 1.3 Configuration Flag
OT_DNS_CLIENT	OPENTHREAD_CONFIG_DNS_CLIENT_ENABLE
OT_DNSSD_SERVER	OPENTHREAD_CONFIG_DNSSD_SERVER_ENABLE
OT_SRP_CLIENT	OPENTHREAD_CONFIG_SRP_CLIENT_ENABLE
OT_SRP_SERVER	OPENTHREAD_CONFIG_SRP_SERVER_ENABLE
OT_TREL	OPENTHREAD_CONFIG_RADIO_LINK_TREL_ENABLE Make sure that the OPENTHREAD_CONFIG_POSIX_APP_TREL_INTERFACE_NAME property is also set to the IPv6 link on which you wish to enable TREL (via the trel:// argument). On a network with at least two border routers, if TREL is enabled on both border routers on the same shared infrastructure link, then they can automatically use that link to provide a single Thread partition.

You can install a pre-built Docker container with OpenThread Border Router:

https://hub.docker.com/r/siliconlabsinc/openthread-border-router/tags

Or you can manually install an OpenThread Border Router by following the steps in *AN1256: Using the Silicon Labs RCP with the OpenThread Border Router* or https://openthread.io/guides/border-router/build.



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