SKKYNET

Skkynet ETK for Renesas Synergy™

Verified Software Add-on

Now you can easily make your embedded device IoT-enabled using the **Skkynet ETK**. View your data on the web, feed an industrial SCADA platform, or connect to other devices and systems.

The Skkynet Embedded Toolkit (ETK) for Renesas Synergy

The Skkynet ETK provides a direct link to the **SkkyHub™** service, a seamless, end-to-end solution for M2M. View device data, connect to other web services, or transport your data to anywhere in the world.

The ETK also connects Renesas Synergy to the **Cogent DataHub®**, a leading industrial middleware product for connecting OPC servers and clients, Modbus slaves, ODBC databases, Excel, and custom .NET programs. The Cogent DataHub also offers a web-based HMI and supports OPC networking, bridging, redundancy, SMS/email notifications, and more.

Seamlessly add the following capabilities to your Synergy application:

SKKYHUB™

Secure, Bi-Directional:
▸ **Communications and Control**
▸ **Data Acquisition**
▸ **Real-time Web-based HMI**

RENESAS Synergy™

SKKYNET **ETK**

DATAHUB®

Connect to OPC, Modbus, Excel, Databases, Real-time Web-based HMI

- Persistent connectivity for transfer latencies only microseconds above network ping time
- Event-driven communication - only data changes are transmitted
- Bi-directional communication, allowing both monitoring and control
- Publish/subscribe data model
- Server-side data discovery - no server configuration necessary
- Efficient structured text data format for low bandwidth usage
- Multiple ingoing and outgoing data sockets on a single thread
- Integrated timers with round-robin sharing with socket data

- Automatic resynchronization when connection is lost and recovered
- Automatic connection retries
- Thread-safe API for developer threads to emit and consume data
- Built-in WebSocket support for traversing proxies
- Support for IPV6
- Optional built-in scripting for powerful local processing
- Optional support for SSL (when available)
- Optional support for Modbus master to multiple slaves
- Optional Modbus/TCP master, with type conversion, deadband and linear transforms
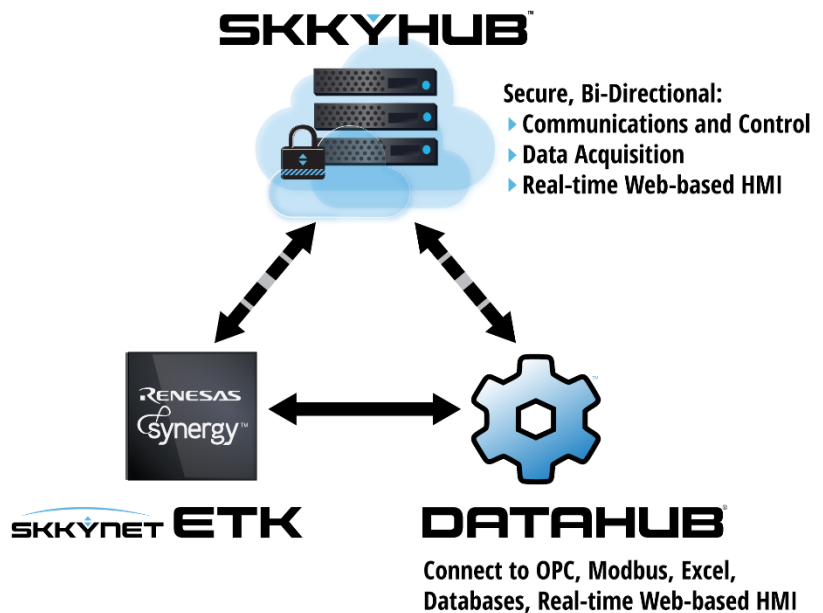
Relationship to SSP

The Skkynet ETK has no hardware dependencies, aside from requiring an Ethernet adapter. It depends only on the ThreadX operating system and the NetX networking layer. Optionally, it can make use of DHCP and DNS client capability within NetX.

User Applications		
Skkynet ETK		
NetX (DHCP, DNS, BSD)		Framework
ThreadX		
HAL		
BSP		
Synergy MCU		

Memory Requirements

The Skkynet ETK has both fixed and variable memory requirements. The variable memory is allocated from a memory heap that is created when the application starts. Variable memory includes:

- user thread stack
- data point definitions
- Modbus I/O address to point mapping
- book-keeping structures within the ETK

By default the ETK allocates 64K of heap space. Less than half of that space is actually used for the sample application that is provided with the ETK.

The fixed-size allocations include the NetX packet pool, thread stacks for DHCP and DNS clients, socket buffers for the NetX BSD implementation, network driver stack and ETK main thread stack. Most of these are fairly small, with the exception of the NetX packet pool which defaults to 80K. The demonstration application executable requires approximately 150K of flash, which includes all ThreadX, NetX and Skkynet ETK code.

Object	Memory required
NetX packet pool	80 KB
NetX thread stacks (driver, DNS, DHCP, BSD)	1 KB x 4
NetX BSD socket table	4 KB
ETK memory heap	32 KB (64 KB recommended)
ETK primary thread stack	4 KB
ETK clock counter thread stack	512 B
Total	~125 – 157 KB

Performance

Performance measures are based on the S7 microcontroller. Modbus polling rate is the rate at which a single Modbus slave device can be polled. A polling rate of 10 ms is the fastest rate available with system clock tick of 10 ms. Transmit and receive rates measure the number of data points per second that can be send and received over a local network when communicating with Cogent DataHub.

Network speed for cloud configurations may have some impact on this speed. Network bandwidth measures the number of bytes to transmit or receive a single data value change. This number will vary with the length of the data point name, and in the case of string data, the length of the string.

Modbus polling rate	10 ms
Transmit data rate	~1000 data changes / second
Receive data rate	~500 data changes / second
Network bandwidth	~100 bytes per data change (typical)
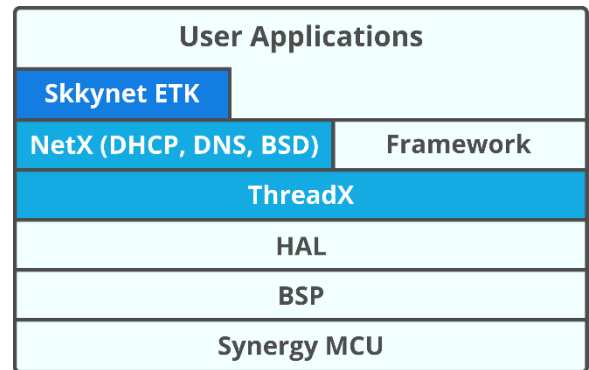
Specific SSP API calls

The Skkynet ETK makes use of a relatively small subset of the ThreadX and NetX API. These calls consist of:

ThreadX	NetX	NetX BSD
tx_byte_allocate	nx_dhcp_create	bsd_initialize
tx_byte_pool_create	nx_dhcp_start	connect
tx_byte_release	nx_dns_create	freeaddrinfo
tx_mutex_create	nx_dns_server_add	getaddrinfo
tx_mutex_delete	nx_dns_server_add	gethostbyname
tx_mutex_get	nx_icmp_enable	getservbyname
tx_mutex_put	nx_ip_create	ioctl
tx_semaphore_create	nx_ip_fragment_enable	read
tx_semaphore_delete	nx_ip_gateway_address_set	recv
tx_semaphore_get	nx_ip_status_check	select
tx_semaphore_get	nx_packet_pool_create	send
tx_semaphore_put	nx_tcp_enable	setsockopt
tx_thread_create	nx_udp_enable	shutdown
tx_thread_sleep		soc_close
		socket
		write

How can Skkynet help?

Connect - Access Your Synergy Data from Anywhere

High-speed data throughput: Collect, send, and receive up to 50,000 data changes per second at speeds just a few milliseconds over Internet latency.

Security: No inbound connections. Supports SSL encryption and password protection.
Requires no VPN or additional security hardware.

Integrity: No changes to the hardware or software of an existing system. You decide what data to transmit, and how: one-way or bi-directionally. You do all the configuration, and only you can make changes to it.

Observe - Visualize Your Synergy Data on the Web

High performance: View any connected process in a web-based interface. Stunning graphics and real-time response replicate or exceed the performance of traditional HMIs.

Secure access: Only qualified users can configure security settings to provide read-only access to limited data sets for public use, while giving bi-directional access to insiders. Authorized developers can access the complete online design interface.

Convenience: Create and edit screens from any location. No coding or development system required, just drag and drop desktop-quality graphics to build HMI screens right inside a web browser. Choose from thousands of symbols, or add your own. Deploy any changes to all users instantly.

Decide - Make Informed Decisions using Real-Time and Archived Data

Real-time analytics: A built-in scripting language and real-time connections to Excel provide a platform for running real-time analytics on data as it flows through the system.

Database integration: Log your process data to any OBDC database (such as SQL Server, MySQL, Oracle, etc.) under any specified conditions. A sophisticated store and forward mechanism ensures that no data is lost due to possible connection failure.

Device to in-plant

The Skkynet Embedded Toolkit (ETK) running on Renesas Synergy provides a direct link to the Cogent DataHub. The Cogent DataHub is a hardened industrial middleware that connects OPC servers and clients, Modbus TCP slaves ODBC databases, Excel, and .NET programs to your Renesas Synergy enabled devices, and supports OPC networking, bridging, redundancy, emails, process trending, and other system integration requirements.

Device to Cloud

The Skkynet Embedded Toolkit (ETK) running on Renesas Synergy provides a direct link to the SkkyHub™ service, which provides a seamless, end-to-end solution for M2M, viewing data from your device on the web, connecting to other web services, or transporting your data anywhere in the world.

About Skkynet

Skkynet is a global leader in real-time data communication systems, whose award-winning SkkyHub™ service collects, processes, and distributes real-time information over networks, locally and remotely. Please go to skkynet.com for more information, or contact us at:

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