The SYN765x is a next-generation device that seamlessly integrates wireless connectivity and compute processing, enabling applications that require multiple wireless technologies and advanced on-chip AI processing.

The SYN765x design emphasizes robust wireless performance, high responsiveness, an improved end-user experience, and low system cost. It incorporates an Arm® Cortex-M52 core and an Arm® Ethos-U55 NPU, enabling advanced capabilities such as AI-based Wi-Fi sensing and keyword detection.

The SYN765x is compatible with the Astra™ software development environment and the MCU SDK, enabling rapid application development. Additionally, the SYN765x SDK includes pre-integrated firmware support for all wireless connectivity options.

Benefits

- **Simplified Design**: Integrated Wi-Fi® 7 + MCU reduces complexity and accelerates time to market.
- **Enhanced End-User Experience**: On-device AI enables local speech recognition, sound event detection, and Wi-Fi presence detection.
- **Versatile Connectivity**: Supports Wi-Fi 7, Bluetooth® LE (BLE) with Channel Sounding, and IEEE 802.15.4 (Thread® & Zigbee®), with Matter®.
- **Robust Security**: Built-in Arm® TrustZone®, PSA Certified Level 3, and Class B compliance.

Applications

- Smart appliances
- Home automation
- Industrial IoT

AI-NATIVE TRIPLE COMBO CONNECTED COMPUTE SoC

MULTI-PROTOCOL CONNECTIVITY: WI-FI 7, BLE, THREAD/ZIGBEE, AND MATTER

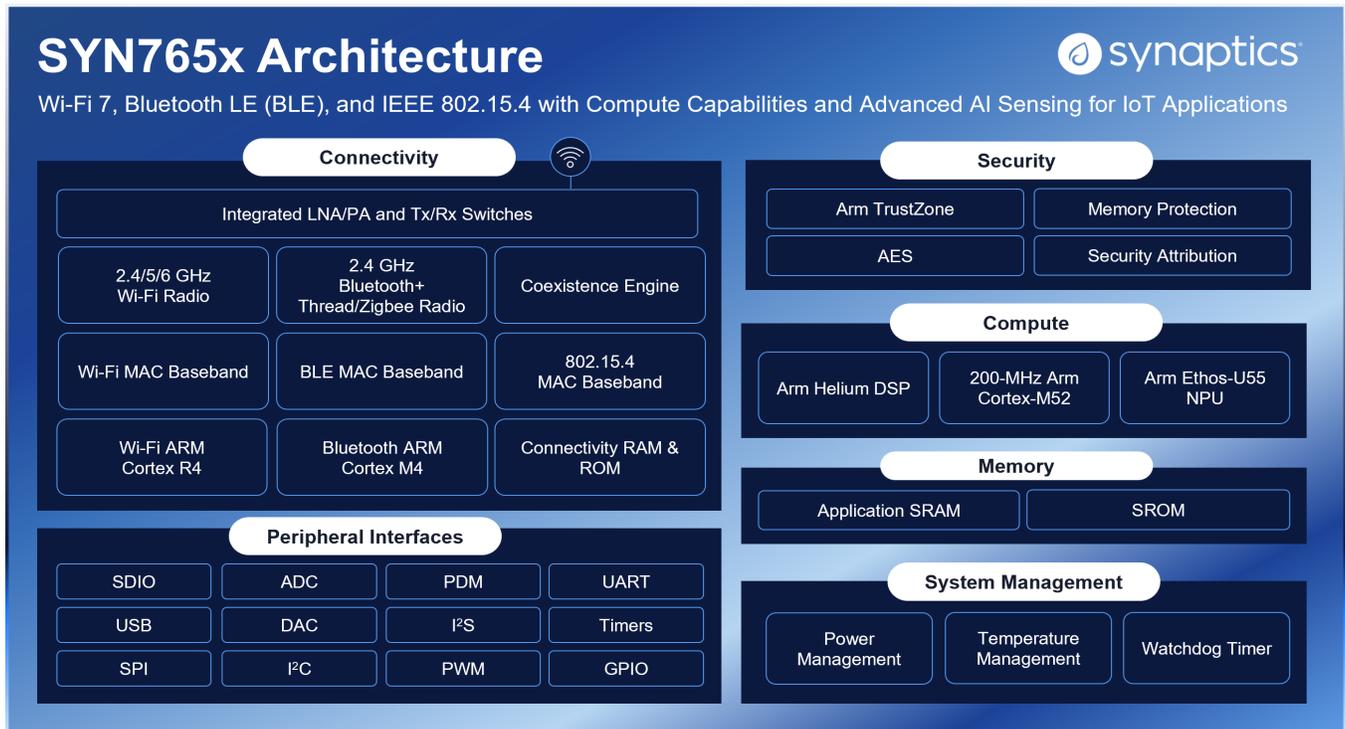AI-ENABLED WI-FI SENSING, BLE CHANNEL SOUNDING, AND SOUND EVENT DETECTION

BROAD APPLICATION COVERAGE FROM RESIDENTIAL TO INDUSTRIAL

Features

- Wi-Fi 7 with integrated/optional PAs and LNAs, offering high Tx power and Rx sensitivity.
- Tri-band 1x1 Wi-Fi 7 on 2.4 GHz, 5 GHz, and 6 GHz.
- Integrated Bluetooth 6.0 with Channel Sounding for precise distance measurement.
- Arm Cortex-M52 processor with an ultra-low-power NN accelerator.
- Includes IEEE 802.15.4 radio for Zigbee, and Thread.
- Enables Matter-compliant interoperability.
- Diverse analog and digital peripherals: SDIO, SPI, UART, I²C, PDM, ADC, DAC, PWM, and USB.

- CSI-based sensing detects presence, activity, breathing, gestures, and micro-movements.
- Advanced audio processing enables real-time voice and sound detection.
- Embedded security includes Arm® TrustZone®, AES encryption, SAU, and MPU.
- Synaptics Smart Co-Ex™ optimizes coexistence of Wi-Fi and Bluetooth in 2.4 GHz.
- Supports FreeRTOS™ and Zephyr® operating systems.

Synaptics 765x Architecture

Wi-Fi 7, Bluetooth LE (BLE), and IEEE 802.15.4 with Compute Capabilities and Advanced AI Sensing for IoT Applications

SYN765x Architecture

Wi-Fi 7, Bluetooth LE (BLE), and IEEE 802.15.4 with Compute Capabilities and Advanced AI Sensing for IoT Applications

Connectivity

Integrated LNA/PA and Tx/Rx Switches

2.4/5/6 GHz Wi-Fi Radio	2.4 GHz Bluetooth+ Thread/Zigbee Radio	Coexistence Engine
Wi-Fi MAC Baseband	BLE MAC Baseband	802.15.4 MAC Baseband
Wi-Fi ARM Cortex R4	Bluetooth ARM Cortex M4	Connectivity RAM & ROM

Peripheral Interfaces

SDIO	ADC	PDM	UART
USB	DAC	I²S	Timers
SPI	I²C	PWM	GPIO

Security

Arm TrustZone	Memory Protection
AES	Security Attribution

Compute

Arm Helium DSP	200-MHz Arm Cortex-M52	Arm Ethos-U55 NPU

Memory

Application SRAM	SROM

System Management

Power Management	Temperature Management	Watchdog Timer

System Block Diagram

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