WIZNET MAGAZINE

WIZ Mag

WIZnet ioNIC: Redefining Ethernet for Embedded Systems

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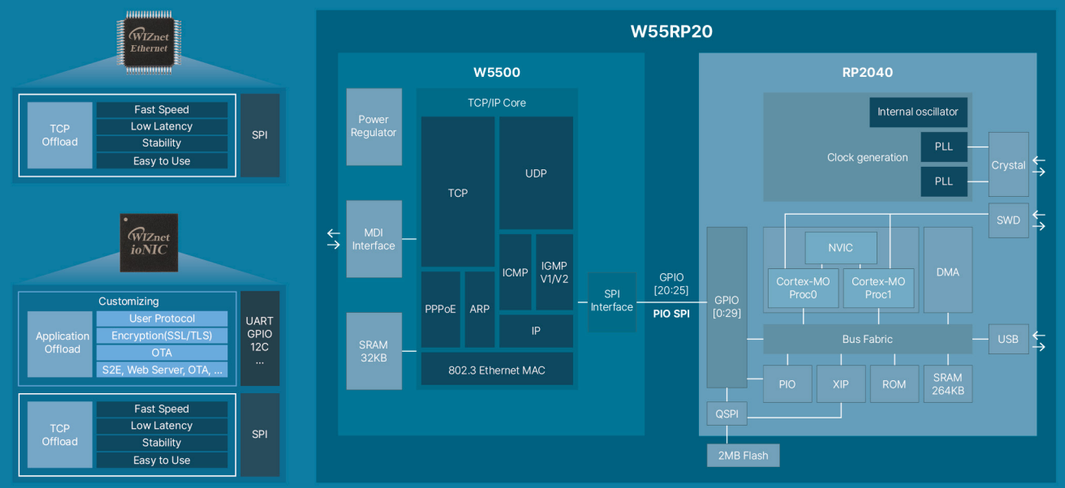
WIZnet

1 Revolutionizing Embedded Networking with WIZnet ioNIC

The W55RP20 Solution

By Matthew



WIZnet ioNIC: An Innovative Approach to Embedded Ethernet Connectivity

WIZnet has long been recognized for its hardware-based TCP/IP offload solutions, which simplify Ethernet integration and reduce MCU overhead in embedded systems. Building on this legacy, the company introduced its WIZnet ioNIC (Internet Offload Network IC) line, designed to combine high-performance networking with streamlined development. A key product in this series is the W55RP20, a System-in-Package (SiP) uniting WIZnet's W5500 Ethernet controller with Raspberry Pi's RP2040 MCU. By merging proven TCP/IP offload technology with a dual-core microcontroller, the W55RP20 aims to make secure, efficient IoT design more accessible.

Streamlined Hardware Offload

At the heart of any WIZnet device is its hardware-based TCP/IP stack, and the W55RP20 is no different. Rather than placing the burden of protocol handling on the microcontroller, its W5500 engine manages tasks such as packet processing, checksums, and connections. This offloading frees the RP2040 to handle high-level application logic—ranging from data analytics to real-time sensor management—while minimizing MCU utilization and development complexity.

Integrating the RP2040 MCU

Central to the W55RP20 is the RP2040 from Raspberry Pi, a dual-core ARM Cortex-M0+ processor running up to 133 MHz with 264 KB SRAM and 2 MB flash memory. It supports interfaces like SPI, I2C, and UART, enabling straightforward connections to sensors, actuators, and other peripherals. By pairing robust TCP/IP offload with a versatile MCU in a single package, developers can design compact and efficient systems without sacrificing performance.

Key Features at a Glance

Hardware TCP/IP Offload	Manages network protocols independently, ensuring stable, low-latency connectivity.
Dual-Core Processing	Two ARM Cortex-M0+ cores facilitate parallel tasks (e.g., real-time data handling).
Integrated Peripherals	Hardware PHY, multiple timers, PWM channels, 23 GPIO pins, 8 TCP/IP sockets, 12 DMA channels.
Rich Development Ecosystem	Supports C/C++, MicroPython, CircuitPython, FreeRTOS, Arduino, LwIP, TLS, SSL, HTTP, MQTT, AWS, and Azure.
OTA Updates	Enables firmware upgrades over the air, reducing maintenance overhead for distributed IoT solutions.

Use Cases

IoT Gateways & Edge Devices	Offers reliable Ethernet connectivity, plus enough processing power for local data aggregation or real-time decision-making before communicating with the cloud.
Smart Home & Consumer Electronics	Manages various sensors efficiently while maintaining a stable network link, and supports OTA updates for feature enhancements.
Industrial Automation	Low-latency Ethernet is critical in robotics and assembly lines, where hardware-based offload ensures minimal delays.
Prototyping & Education	Backed by a broad community for both WIZnet and RP2040, enabling rapid prototyping and easier hardware-software integration.

Advantages of a Single-Chip Approach

By combining the MCU and Ethernet controller into one device, the W55RP20 reduces board space, component count, and potential signal issues. This integration allows engineers to focus on creating feature-rich applications rather than spending time on intricate hardware design.

Future of the WIZnet ioNIC Line

WIZnet's ioNIC products, led by the W55RP20, provide robust offloading, security, and application-specific processing features. As IoT demands continue to expand, the ioNIC series will evolve to deliver secure, scalable solutions for a wide variety of embedded projects.

Conclusion

The W55RP20 reflects WIZnet's commitment to simplifying embedded networking. By integrating the proven hardware TCP/IP engine of the W5500 with the flexibility of Raspberry Pi's RP2040, it offers a streamlined, cost-effective development path.
For engineers seeking reliable, user-friendly Ethernet solutions that reduce design complexity and boost performance, the WIZnet ioNIC range—especially the W55RP20—presents a forward-looking option that empowers innovative embedded applications.

2 W55RP20-S2E

By Matthew

Simplified S2E with Built-In Firmware

Introducing W55RP20-S2E Simplifying Serial to Ethernet Solutions

WIZnet has introduced the **W55RP20-S2E**, a pre-programmed Serial to Ethernet (S2E) chip that simplifies the integration of Ethernet functionality into serial devices. This product was created to address the needs of developers who previously had to purchase separate Ethernet modules or chips, implement custom firmware, and manage MAC addresses manually. With the **W55RP20-S2E**, WIZnet eliminates these complexities by offering a single, ready-to-use solution that includes everything needed to add Ethernet networking to your serial devices.

Key Features

The **W55RP20-S2E** comes with an integrated Serial to **Ethernet (S2E) firmware** and a unique MAC address. It supports **10/100Mbps Ethernet,** allowing for reliable network communication, and offers **up to 921,600bps serial communication** speed. This enables seamless integration of devices with UART interfaces, allowing them to be easily controlled over an Ethernet network.
Other notable features include support for **RS-232C, RS-422/485** (with external circuitry), SSL and MQTT clients, Modbus RTU/ASCII to Modbus TCP conversion, and secure TCP connection passwords. Configuration is simple via **AT commands** or the **Configuration tool**, and the chip includes both **Data UART** and **Debug UART** ports for flexible communication.

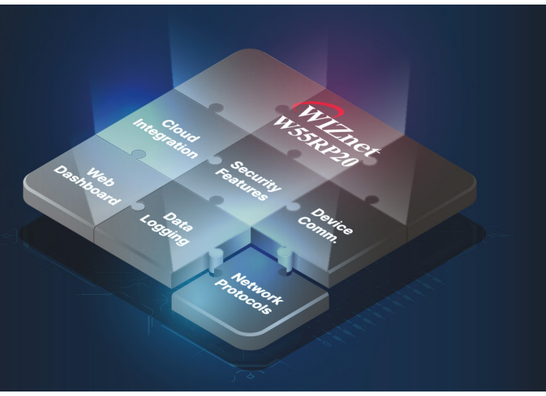
Customization and Support

WIZnet also provides **customization services** for customers, allowing the ability to change initial settings, add protocols, or even change the MAC address based on specific application needs. This service ensures the **W55RP20-S2E** can be tailored to suit a wide range of industrial, IoT, and embedded projects.

The **W55RP20-S2E** is a comprehensive, cost-effective solution for adding Ethernet networking capabilities to serial devices without the hassle of additional hardware or firmware development. Perfect for developers in need of a fast, reliable, and customizable solution, the **W55RP20-S2E** significantly simplifies the Serial to Ethernet integration process.

For more information and customization options, visit WIZnet's official website or contact our support team.

3 WIZnet Custom Service



Introducing Firmware Customization Services

While the S2E firmware provides an excellent out-of-the-box solution, many applications demand features that cater to specific operational requirements. To address this, WIZnet is launching a customization service that allows customers to:

1. Modify Firmware Settings	Optimize default parameters like socket behavior, baud rates, and network modes.
2. Add Unique Features	Implement proprietary protocols, integrate custom security measures, or enable specialized functionalities like cloud connections or advanced web server configuration pages.
3. Enhance User Experience	Tailor the configuration interface or AT command set for specific workflows.
4. Ensure Seamless Integration	Customize firmware for compatibility with existing hardware or software environments.

This service aims to reduce development cycles and enable customers to focus on their core innovations rather than the intricacies of firmware development.

Benefits of the Customization Service

By opting for WIZnet's firmware customization service, customers gain access to:

Expertise

A dedicated team with in-depth knowledge of W55RP20 and Ethernet connectivity.

Efficiency

Accelerated time-to-market through rapid firmware modifications.

Reliability

Assurance of high-quality, thoroughly tested firmware aligned with specific needs.

Scalability

Support for evolving requirements as applications expand or change over time.

How to Get Started

WIZnet has streamlined the process of requesting and implementing firmware customizations. Customers can begin by sharing their requirements through our dedicated support channels. Our team will evaluate the feasibility, provide a detailed proposal, and ensure transparency throughout the development process.

For more information or to request customization, visit our website or contact us at direct@wiznet.io. Let us help you bring your vision to life with connectivity solutions that go beyond the ordinary.

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WIZnet W232N

The Complete Serial to Ethernet Solution

By Matthew

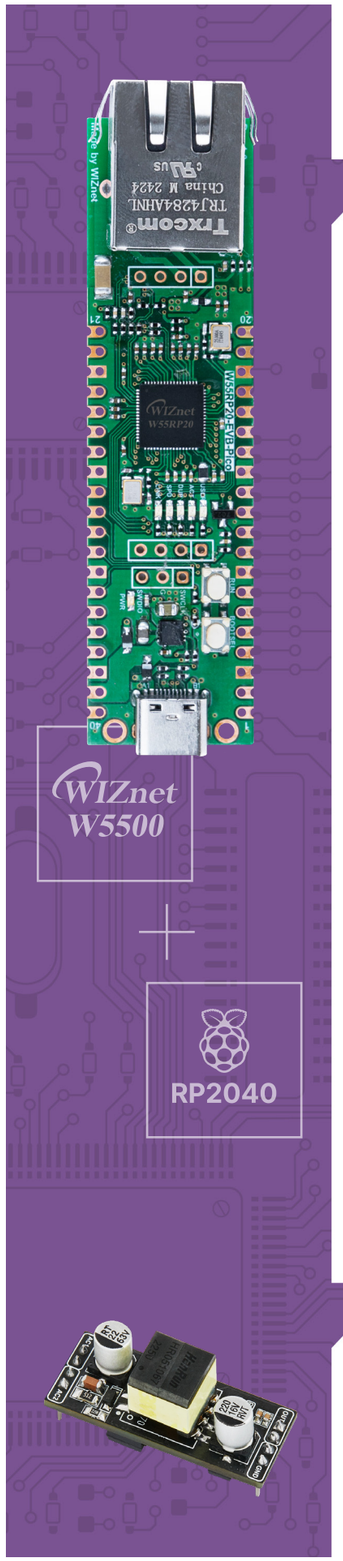
Introducing WIZnet W232N: The Complete Serial to Ethernet Solution

WIZnet's W232N is an industrial-grade Serial to Ethernet (S2E) device, designed to simplify the integration of Ethernet functionality into existing serial devices. Unlike previous solutions that required separate components, firmware development, and hardware design, the W232N comes fully enclosed in a compact case, ready for immediate deployment in industrial settings.

Key Features

RS232 to Ethernet Conversion	Seamlessly converts data between RS232 serial devices and Ethernet, enabling easy network connectivity without additional hardware.
Protocol Support	Supports Modbus TCP to Modbus RTU/ASCII conversion, SSL, MQTT, and TCP Client protocols.
High-Speed Communication	Supports 10/100Mbps Ethernet and serial speeds up to 230kbps.
Industrial Design	Certified for KC, FCC, and CE standards, ensuring high system reliability and stability. It also operates within a wide temperature range of -25°C to 80°C and supports DIN rail mounting.
Easy Configuration	Configurable via Web Config or AT commands, and offers password protection for secure device discovery.
Power Options	Can be powered through DC jack, terminal block, or PoE(by installing a separate WIZPoE-P1 Module)

The W232N is perfect for environments where you need to quickly add Ethernet connectivity to existing serial equipment without worrying about hardware or firmware development.



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W55RP20 EVB-Pico (with PoE)

By Matthew

Introduction

The W55RP20-EVB-Pico is an exciting evaluation board that brings together the best of two worlds. By combining the W5500 wired TCP/IP controller with the Raspberry Pi RP2040 microcontroller, this board lets you tap into the powerful networking features of the W5500 while enjoying the versatility and ease of use of the Raspberry Pi Pico. Whether you're diving into Ethernet-based projects or exploring the RP2040's capabilities, this board offers a seamless experience that's both functional and fun to work with.

Features

- Although the board has identical pinout with Pico board, there are only 19 GPIO pins available
- Industrial temperature (-45°C ~ 85°C)
- Wide Voltage Level Input : 1.8 V ~ 5.5V
- 3-pin ARM Serial Wire Debug(SWD) port
- 10 / 100 Ethernet PHY embedded
- Supports Auto Negotiation
  - Full/Half Duplex
  - 10/100 Based
- Built-in RJ-45 (PoE)
- Built-in DCDC (PWM/PFM)

WIZPoE-P1

- IEEE802.3af compliant
- Mode A(Endspan), Mode B(Midspan)
- Wide input voltage range 40Vdc ~ 60Vdc
- High DC/DC conversion efficiency
- Isolation
- Internal build in 2 channel bridge rectifiers

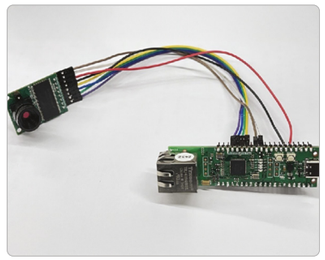
6 WIZnet Insider Projects

Experiments & Innovations From Our Team

By Benjamin

Viktor

High-Resolution Image Capture with Arducam and W55RP20-EVB-Pico



Integrates Arducam's 2MP module with a custom webserver on the W55RP20-EVB-Pico, enabling high-resolution image capture and chunk-based data delivery. Designed with robust buffer management, it smoothly handles large JPEG files—laying the groundwork for advanced camera features, dual-core operations, and potential live streaming extensions in future updates.

https://maker.wiznet.io/viktor/projects/from-arducam-mini-to-web-high-resolution-image-capture-and-delivery/?serob=rt&serterm=year

Jaden

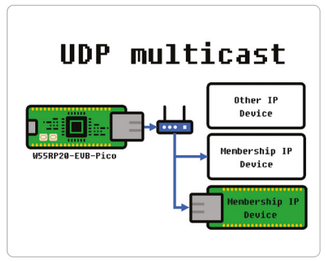
W55RP20-EVB-Pico Network Scanner

Explore this compact device that auto-detects WIZnet modules on your network and neatly displays each device's name and MAC address on an LCD. Perfect for rapid IoT management, it features a trigger button for seamless scanning and promises future upgrades like direct configuration and navigation options—its simplicity and expandability truly impressed me.

https://maker.wiznet.io/jaden/projects/config-device-1/?serob=rt&serterm=year

Grace

UDP Multicast on W55RP20-EVB-Pico



Explore an efficient data distribution method by broadcasting packets to multiple devices within the local network simultaneously.
This approach, which maps multicast IPs directly to MAC addresses and bypasses ARP, reduces overhead and enables real-time applications such as streaming broadcasts or urgent alerts.

https://maker.wiznet.io/Grace_Koo/projects/setting-up-udp-multicast-on-w55rp20-evb-pico-/?serob=rt&serterm=year

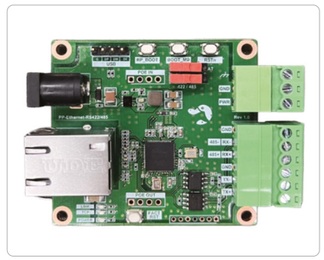
7 Innovating with W55RP20

Success Stories from Our Partners

By Matthew

Alan

Platypus RS485 to Ethernet Module with W55RP20



This industrial-grade RS485-to-Ethernet module, powered by WIZnet's W55RP20, ensures stable and low-latency communication in automation networks. Its robust design facilitates seamless data transmission between serial devices and Ethernet-based systems, making it an ideal solution for industrial IoT applications and remote monitoring setups.

https://maker.wiznet.io/Alan/resellers/wiznet-success-stories--platypus-rs485-to-ethernet-module/

Alan

Nicomtek HeatSense LED with W55RP20

Experience real-time temperature visualization with Nicomtek's HeatSense LED, integrating W55RP20 for seamless Ethernet connectivity. Designed for industrial safety and smart lighting applications, it enables remote monitoring and instant alerts based on temperature fluctuations—offering enhanced operational awareness and energy efficiency.

https://maker.wiznet.io/Alan/resellers/wiznet-success-stories--nicomtek-heat-sense-led

Alan

Solar Power Monitoring System by Daeyeon C&I

Powered by W55RP20, this solar power monitoring solution provides real-time energy tracking and remote diagnostics via Ethernet. By ensuring seamless data collection and analysis, it helps maximize efficiency in renewable energy installations—enabling smarter, data-driven decisions for sustainable power management.

https://maker.wiznet.io/Alan/resellers/wiznet-success-stories--daeyeon-c-i-solar-power-monitoring-system/

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WIZnet EVB Pico 2

By Viktor & Benjamin

The Raspberry Pi has introduced the RP2350, a significant advancement over the popular RP2040 microcontroller. While the RP2040 was celebrated for its affordability and flexibility, the RP2350 offers enhanced performance, improved security features, and greater efficiency, making it ideal for more demanding applications.

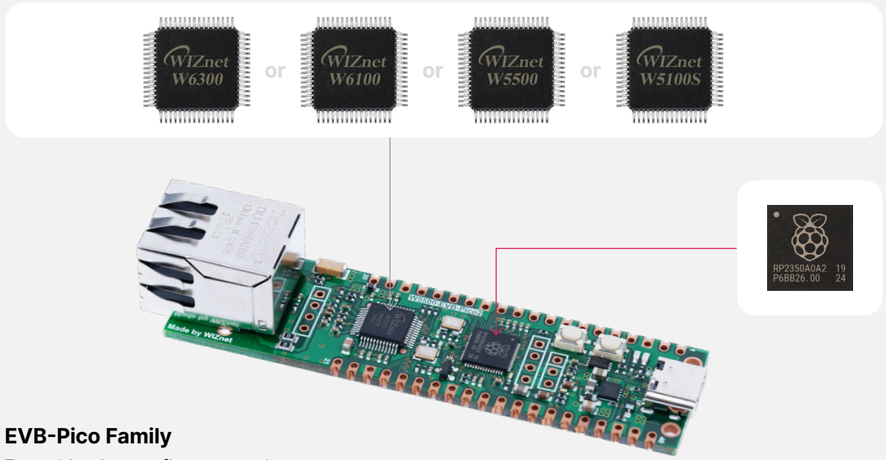
RP2350 vs. RP2040: Key Improvements

The RP2350 brings several noteworthy upgrades:

1. Processing Power	Equipped with two 150MHz Arm Cortex-M33 cores, the RP2350 offers better performance than the RP2040's dual Cortex-M0+ cores, with additional floating point and DSP support for complex tasks.
2. Memory Architecture	The RP2350 includes 520KB of on-chip SRAM, split into ten concurrently accessible banks, allowing for more complex and memory-intensive applications.
3. Power Management	The RP2350's on-chip switch-mode power supply and low-quiescent-current LDO optimize power consumption, ideal for energy-efficient, battery-operated devices.

Accelerated Security with the RP2350

The RP2350's comprehensive security architecture, featuring Arm TrustZone and hardware-accelerated cryptography, significantly enhances the efficiency and security of tasks such as SSL/TLS encryption. The following graph demonstrates the RP2350's reduced SSL connection time compared to the RP2040, highlighting its capability to handle secure transactions more efficiently.



EVB-Pico Family

7 combinations to fit your needs

	W5100S	W5500	W6100	W6300
RP2040	✓	✓	✓	
RP2350	✓	✓	✓	✓

The **WIZnet EVB Pico 2 series** is designed to simplify and enhance Ethernet connectivity in embedded systems. By integrating WIZnet's industry-leading Ethernet controllers (W6100, W5500, and W5100S) directly onto the board, these evaluation boards eliminate the need for additional components or connections, offering a streamlined solution for developers.

Ideal for IoT projects, industrial automation, and secure communications, the EVB Pico 2 series provides **reliable, high-performance Ethernet capabilities** in a compact form factor.

Features

Integrated Ethernet Solution	The WIZnet EVB Pico 2 series seamlessly integrates WIZnet's W6100, W5500, and W5100S Ethernet controllers onto a single board, enabling stable and low-latency Ethernet communication without the need for external modules or complex wiring
Simplified Development	By combining the RP2350 microcontroller with WIZnet's Ethernet controllers, the EVB Pico 2 series reduces the complexity of hardware design, making it easier and faster to develop Ethernet-enabled applications
Flexible Connectivity Options	With up to 48 GPIOs and support for multiple interfaces (UART, I2C, SPI, PWM), the EVB Pico 2 series is versatile enough to meet a wide range of application needs, from simple IoT devices to complex industrial systems.

GET **FREE** *ioNIC* SAMPLE!

How to claim

Step 1

Scan the QR code

Step 2

Fill out the form

Step 3

Pick up at EW 2025 booth #3A-140 or have it shipped to you

Limited stock - act now!

WIZnet