Application Note

Router Features

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> **Info**
>
> **Compatibility Notice:**
> This manual applies to firmware version **6.6.0 (December 17, 2025)**. Features introduced after this version may not be covered.

1. Operating System

The Linux-based operating system designed for Advantech cellular routers combines the user-friendliness of a web-based configuration interface with the versatility and power of an open platform. This design facilitates the development of custom configuration scripts and Router Apps, allowing for extensive customization. The features and functionalities described in this chapter are supported by the most recent firmware version for these routers.

1.1 LAN Features

Feature	Description
Ethernet	Supports 10/100/1000 Mbps speeds in both half and full duplex modes. Offers *IEEE 802.1X Authentication* (as a client) with `EAP-PEAP/MSCHAPv2` or `EAP-TLS` methods for secure network access. Features bridged interfaces and the *802.1d Spanning Tree Protocol* (configurable via script only).
VLAN	Supports *IEEE 802.1Q VLAN tagging*, allowing the creation of up to three virtual LANs on a single physical Ethernet interface. These virtual interfaces can be used for network segmentation or as a basis for other connections, such as PPPoE.
Port-based VLAN	Routers equipped with a switch interface support Port-based VLANs, enabling traffic segmentation by assigning specific physical ports to distinct VLANs.
IPv4/IPv6	Provides full support for both IPv4 and IPv6 dual-stack operation, including multicast capabilities.
DHCP Client	Features a configurable DHCP client for automatically obtaining an IP address and other network settings from a DHCP server. Supports DHCPv4 and DHCPv6.
DHCP Server	Offers both dynamic and static DHCP leases with a customizable lease time for managing IP address allocation within the local network. It also supports IPv6 prefix delegation for distributing network addresses to downstream routers.
DNS Forwarder	Provides DNS forwarding, which can enhance network efficiency and speed up domain name resolution for local clients by caching DNS queries.
DHCP Relay	Incorporates support for a DHCP Relay Agent, which forwards DHCP requests from clients to a DHCP server on a different subnet, facilitating centralized IP address management.
VRRP	Supports *Virtual Router Redundancy Protocol* (VRRPv2 and VRRPv3) to create redundant, high-availability router setups, ensuring continuous network connectivity by switching to a backup router in case of failure.

Table 1: LAN features

1.2   Connectivity Features

Feature	Description
Mobile WAN	Depending on the model, supports GPRS, UMTS, LTE, and 5G cellular technologies with PAP and/or CHAP authentication. Accommodates up to two SIM cards with optional PIN protection. Features automatic SIM switching based on connection failure, roaming status, data limit, or Digital Input state. Includes dial numbers for CSD connections and supports private APN usage. Also supports PLMN whitelisting to permit connections exclusively to specific operators. Monitors traffic limits with SMS warnings and provides a connection log. Offers functionalities for SIM lock and unlock.
PPPoE Client	Enables connections to broadband services using PAP and/or CHAP authentication. Includes support for PPPoE over VLAN (PPPoEoV). You can select a pre-configured VLAN interface (e.g., `eth0.100`) directly as the PPPoE interface.
Wi-Fi Access Point / Wi-Fi Station	Depending on the model, supports IEEE 802.11b/g/n (2.4 GHz), 802.11a/n/ac (5 GHz), and 802.11ax / WiFi 6 and 6e. Provides *WPA/WPA2/WPA3* authentication with Pre-Shared Key (PSK) or an external RADIUS server. Features WEP, TKIP, or AES encryption. Incorporates Wi-Fi Multimedia (WMM) for QoS. Includes *Accept* or *Deny* lists for MAC address filtering, as well as SSID and client isolation. Supports simultaneous AP and Station modes, with support for two SSIDs in AP mode. The *Follow STA radio settings* feature adjusts the AP to align its radio settings with a foreign AP.
Automatic Channel Selection (ACS)	Automatically selects the optimal Wi-Fi channel to minimize interference and improve performance. This feature is enabled by default on most platforms. The list of available channels is dynamically filtered based on the Wi-Fi module's capabilities and the selected Country Code. *Note: After changing the Country Code, you must click Apply for the channel list to update.*
Bluetooth[1]	Certain router models provide Bluetooth functionality, which can be enabled by installing the official Bluetooth Router App. This allows the router to communicate with nearby Bluetooth-enabled devices.

Table 2: Connectivity features

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[1]Hardware-dependent feature. Requires a specific Router App to be installed.

1.3   Routing Features

Feature	Description
Static Routes	Allows manual configuration of up to thirty-two routing paths to direct traffic towards a specified destination through a designated gateway and interface.
Backup Routes	Automatically switches to backup connections if the primary link fails. Supports backup via Mobile WAN, PPPoE, Wi-Fi Station, or Ethernet. Offers modes for *Single WAN*, *Multiple WANs* (for accessibility on all links), and *Load Balancing* to distribute traffic according to predefined weights.
Stateful Firewall	Enables detailed filtering of incoming and forwarded packets for both IPv4 and IPv6. Rules can be defined based on source/destination IP, protocol, and port. Includes protection against common Denial of Service (DoS) attacks. Supports up to thirty-two rules for both incoming and forwarded packets.
Site Blocking	Enables blocking access to specific websites by defining a list of URLs or domain names within the firewall configuration. For advanced features, such as category-based filtering, consider using the *URL Blocker* Router App.
NAT	Facilitates access from the public WAN to services on the private LAN. Allows forwarding of incoming traffic to specific IP addresses and ports (*Port Forwarding*), including forwarding all unspecified traffic to a default server. Supports *Port Address Translation* (PAT), masquerading of outgoing packets, and *NAT64* for IPv6-to-IPv4 translation.
QoS (via scripting)	Quality of Service settings can be tailored through custom scripts, enabling precise control over traffic prioritization and bandwidth allocation for critical applications. Wi-Fi QoS is supported natively via WMM.

Table 3: Routing features

1.4 VPN Features

Feature	Description
IPsec	Supports both policy-based and route-based VPNs with IKEv1/IKEv2. Authentication methods include pre-shared keys or X.509 certificates (RSA/ECDSA), including TPM-based hardware key storage for enhanced security. Offers a broad selection of ciphers (e.g., AES-GCM, SHA512), Dead Peer Detection, and Perfect Forward Secrecy.
Cisco FlexVPN	Provides a Cisco-specific implementation of the IKEv2 standard, configurable via the IPsec settings page for robust and flexible VPN solutions with Cisco environments.
OpenVPN	A highly flexible VPN solution supporting IPv4/IPv6 over UDP or TCP in either client or server mode. Authentication can be performed via a pre-shared secret or X.509 certificates for versatile and secure connections.
WireGuard	A modern, high-performance VPN solution that is simple to configure. Allows for the creation of up to four secure, lightweight tunnels with minimal overhead using state-of-the-art cryptography.
GRE Tunnels	An unencrypted tunneling protocol supporting keyed tunnels with a 32-bit pre-shared secret and multicast traffic. Multipoint tunnel support can be enabled with the NHRP Router App.
L2TP	An unencrypted tunneling protocol supporting client or server mode for creating VPNs. It can be used in conjunction with IPsec to provide encryption.
PPTP	An unencrypted legacy tunneling protocol supporting client or server mode. Provides PPTP Passthrough capabilities. Its use is discouraged due to known security vulnerabilities.

Table 4: VPN features

1.5   Services Features

Feature	Description
DynDNS Client	Automatically updates dynamic IP addresses (IPv4 and/or IPv6) with popular DynDNS service providers, allowing remote access to the router via a consistent hostname.
NTP Client / Server	Supports time synchronization utilizing the NTPv4 protocol with up to three remote NTP servers. Can also function as an NTP server for the local network to provide consistent time to other devices.
SSH / SFTP Server	Secure Shell and Secure File Transfer Protocol services are available for users with *Admin* role, ensuring secure remote command-line administration and file management.
Telnet Server	Provides unencrypted remote console access. Its use is strongly discouraged for security reasons.
FTP Server	Enables unencrypted file transfers for authenticated users. Its usage is generally not recommended due to its lack of security.
Serial over TCP/UDP	Facilitates access to RS232/RS485/RS422 serial interfaces via UDP or TCP client/server connections. Also supports many common USB-to-serial converters for extended connectivity.
GNSS Receiver	For models supporting GNSS, enables location tracking using the cellular module's capabilities. Supports forwarding NMEA messages to the system console, serial ports, or external servers via TCP/UDP.
External Data Storage	Allows for the use of USB flash drives or MicroSD cards for additional data storage, logging, hosting custom files, or for automatic updates.

Table 5: Services features

1.6 Administration Features

Feature	Description
Web / HTTP(S)	Employs TLS 1.2+ for secure web interface connections. HTTP requests can be automatically redirected to HTTPS. Implements brute-force attack mitigation by temporarily banning an IP address for 1 minute after 3 unsuccessful login attempts.
SNMP Agent	Compatible with SNMP v1, v2c, and v3 (with authentication and encryption). Offers standard MIBs for system/network information, plus custom MIBs for mobile WAN, GPS, and I/O. Supports remote control of Binary I/O and reporting via SNMP Traps.
SMTP(S) Client	Secures email sending with SSL/TLS or STARTTLS encryption. Enables sending of automated email notifications from custom scripts.
Events	Allows for the configuration of automated actions triggered by specific system events or state changes, offering a flexible mechanism for event-driven router behavior.
User LED	Allows customization of the user-defined LED (USR) to indicate specific events or statuses. It can be configured via *Configuration → Peripheral Ports → Inputs/Outputs*.
SMS Control	Supports sending notifications for critical events (e.g., reboot, WAN outage, input change). Allows remote control of the router via SMS commands (e.g., `reboot`, `go online`, `set out0=1`) and supports user-initiated SMS through AT commands or TCP/serial interfaces.
Custom Scripts	Executes user-defined shell scripts at startup (*Startup Script*) or in response to WAN interface status changes (*Up/Down Scripts*), allowing for flexible automation and customization.
Status Displays	Provides real-time information on *Network*, *Mobile WAN*, *Wi-Fi*, *DHCP*, *IPsec*, *WireGuard*, and *DynDNS* status for comprehensive operational monitoring.
Active Connections	Displays a detailed, real-time list of all active network connections (sessions) on the router. This is useful for troubleshooting and is accessible via a link on the *Status → Network* page.
Logging[1]	Offers persistent local log storage and the ability to forward logs to a remote syslog server. Features include secure forwarding over TCP with SSL/TLS, optional certificate-based authentication, and periodic *Mark Messages* for availability checks.
One-Click Report	Facilitates the easy collection of detailed configuration and status data into a single text file (*Save Report*) for efficient troubleshooting and support.
Live Data in GUI	Automatically updates status information in the web GUI in real-time, eliminating the need for manual page refreshes.

Table 6: Administration features

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[1]Not available on ICR-2000/2400/2500/2600 platforms.

1.7 Configuration Features

Feature	Description
Quick Setup	A page displayed upon initial login to a new router, allowing for the configuration of essential settings required for basic operation on a single screen.
Passwordless Console Login	Allows secure SSH access without a password by utilizing SSH Public Key authentication, enhancing both security and convenience for automated access.
Profiles	Supports up to four independent configuration profiles (1 standard, 3 alternate). Allows for dynamic router reconfiguration based on different operational scenarios, switchable via web interface, SMS, or digital input state.
Online Firmware Update	Facilitates firmware updates directly from the router's web GUI by connecting to the public Advantech server over the Internet.
Online Router App Installation	Enables the installation or updating of Router Apps directly from the router's GUI, using the public Advantech server over the Internet.
Backup and Restore	Offers the ability to back up and restore the complete router configuration, including defined users, in an optionally password-encrypted file for secure and easy management.
Automatic Update	Schedules firmware and/or configuration updates to be performed at a specified time or periodically. Updates can be downloaded from a Web (HTTP/S, FTP/S) server or a local USB flash drive.
Upgrade Rollback	Automatically reverts a firmware upgrade if the router fails to reboot successfully afterward, ensuring system reliability and preventing downtime.
Schedule Reboot	Allows for scheduling a router reboot at a specific time and day of the week.
Factory Reset	Allows for resetting the router to its factory default settings, effectively erasing all custom configurations.

Table 7: Configuration features

1.8 Security Features

Feature	Description
User Authentication (PAM)	A comprehensive user management system with support for a local user database or remote authentication via RADIUS/TACACS+. The *Services →* *Authentication* page offers: • **Password Policies:** Admins can enforce password complexity (*Force Password Complexity*) and set automatic expiration periods. • **Forced First Change:** Passwords set by an admin are expired by default, forcing the user to set a new one upon first login. • **Account Lockout:** The system can lock an account after a specified number of failed login attempts, configured via *Lock Account After*, *Count Fails For*, and *Unlock After*. • **Login Delay:** A delay can be enforced between login attempts (*Delay After Fail*) to mitigate brute-force attacks. • **Two-Factor Authentication (2FA):** Enhances security with a second verification factor (TOTP), easily configured via a QR code. • **Secure Password Changes:** Users must enter their previous password to set a new one. Optional email/SMS notifications can alert users of account changes.
Login Banner	Allows for the configuration of a custom text message displayed on the login page, typically used for legal notices or system identification.
Secure Boot	For S1 Routers only, Secure Boot ensures that only Advantech-signed and verified firmware can run on the device, preventing the execution of unauthorized or malicious code.
System Integrity Check	For S1 Routers only, feature a configuration integrity check, including configuration hashes and AIDE, to ensure that all settings remain secure and unaltered. If the system detects that the configuration of a service has been modified improperly, it will automatically stop that service to prevent potential security risks.

Table 8: Security features

2. Router Apps

Router Apps, formerly known as User Modules, are specialized software packages that extend the core functionality of Advantech cellular routers. Beyond the extensive set of modules offered by Advantech, users can also develop their own custom applications using the provided Software Development Kit (SDK) to meet specific project requirements.

> **Info**
>
> - In addition to the official Router Apps, a growing collection of example applications with source code is available in our *Public Bitbucket Repository* to aid your development.
>
> - Note that a limited number of Router Apps are supported on the v1 product platform. To see which apps are supported, please visit the *Available Router Apps for category v1*.

2.1 Connectivity Router Apps

App Name	Description
802.1X Authenticator	Implements an 802.1X authenticator (server) role, allowing the router to control network access via an external RADIUS server, with the ability to exempt specific MAC addresses.
Band Select	Allows for the manual selection of specific cellular frequency bands, which can help optimize performance and stability in challenging RF environments.
Backup APN	Automatically switches to a secondary Access Point Name (APN) if the primary APN connection fails, ensuring resilient cellular connectivity.
Bluetooth	Incorporates Bluez 5 and D-Bus to provide comprehensive Bluetooth functionality, enabling communication with nearby Bluetooth devices.
Ethernet Mirroring	Allows mirroring of data packets from one Ethernet interface to another, which is useful for network traffic monitoring or analysis with an external device.
Layer 2 Firewall (L2FW)	Filters network traffic based on MAC addresses to enhance security at the data link layer.
NAT	Implements advanced Source NAT (SNAT) and Destination NAT (DNAT) rules for flexible internet sharing and granular access control.
PPP Gateway	Enables internet access for legacy devices that only have a serial line interface by encapsulating their traffic in PPP frames.
Transparent Mode	Directly assigns the public IP address from the mobile WAN connection to a device connected to the router's Ethernet port, simplifying network configuration.
URL Blocker	Restricts access to specific domain names (URLs) for content filtering, security policy enforcement, or productivity management.
WiFi SSID Switch	Dynamically switches the router's Wi-Fi client (station) between up to four predefined Wi-Fi Access Points based on signal strength or availability.
WiFi STA Relay	Bridges the Wi-Fi station mode interface to an Ethernet port, enabling a transparent Layer 2 connection over a Wi-Fi link.

Table 9: Connectivity router apps

2.2 Routing Router Apps

App Name	Description
FRR	Provides a comprehensive suite of Internet routing protocols (including BGP, OSPF, and RIP) specifically tailored for Advantech routers, enabling advanced dynamic routing.
OpenVPN Custom Config	Enables advanced, text-based configuration of OpenVPN tunnels, offering greater flexibility for complex VPN setups beyond the standard GUI options.
Stunnel	Creates encrypted SSL/TLS tunnels for network traffic, adding a layer of security for data in transit, especially for applications that do not natively support encryption.

Table 10: Routing router apps

2.3 Services Router Apps

App Name	Description
Captive Portal	Provides a customizable access page for Wi-Fi users, offering features such as password authentication, bandwidth limits, session timeouts, and data usage caps.
File Uploader	Automates the transfer of files to and from FTP/SFTP servers, including downloading, uploading, and cleanup of old files, facilitating seamless data distribution.
GPSD	Enables and configures the GPSD daemon, a service that collects NMEA data from the GNSS receiver and makes it accessible to other applications or network clients via TCP/IP. Additionally, it includes command-line tools `cgps` and `gpsmon` for real-time diagnostics and monitoring of satellite data directly from the router's console.
MQTT Broker	Implements a local MQTT message broker for IoT messaging, based on the popular Mosquitto project.
MQTT Manager	Enables remote control and monitoring of Advantech routers via the MQTT protocol, allowing for integration into IoT platforms.
NetFlow/IPFIX	Supports NetFlow v5, v9, and IPFIX protocols for comprehensive network traffic analysis, with options for sampling and exporting flow data to collectors.
NTRIP Client	Enhances GPS accuracy by utilizing RTK corrections from an NTRIP base station, ideal for applications requiring high-precision positioning.
Samba	Provides a Samba server for shared access to the router's `/var/data/samba` directory, enabling easy file sharing on Windows networks.

Table 11: Services router apps

2.4 Administration Router Apps

App Name	Description
Customer Logo	Allows for branding of the web administration interface with a custom logo, enhancing corporate identity.
GNU Nano	A simple and user-friendly command-line text editor.
Lynx Web Browser	A text-based web browser. Lynx allows for browsing the web from the console, supporting frames and tables but not images.
Ext4 Filesystem Utilities	Adds advanced filesystem management capabilities (e.g., checking, repairing) for storage devices using the ext4 filesystem.
Firmware Over-The-Air (FOTA)	Enables remote firmware updates for the router's cellular module, ensuring it has the latest features, performance improvements, and security patches.
Loopback	Creates a virtual loopback interface, which is useful for advanced routing strategies, testing, and management purposes.
Midnight Commander	Adds a user-friendly, text-based file manager to the router's console for easier file navigation and operations.
Nmap	Delivers a powerful network discovery and security auditing tool to identify hosts, services, and potential vulnerabilities on a network.
PDU SMS	Extends the standard SMS capabilities to allow for the sending and receiving of longer, concatenated messages in PDU format.
Pinger	Ensures network reliability by continuously monitoring connectivity to a specified host, with options for automatic notifications or actions upon failure.
SCEP Client	Offers a secure and automated method for router certificate enrollment using the Simple Certificate Enrollment Protocol (SCEP), simplifying device authentication.
Sleep Mode	Enables significant energy savings by configuring the router to enter a low-power mode based on a time schedule or digital input signals.
TCP SYN Keep-Alive	Actively verifies the router's ability to establish new TCP connections by sending SYN packets, enhancing network reliability diagnostics.
Vim	Provides a powerful and highly configurable text editor for complex scripting and configuration file editing directly on the router.
Web Terminal	Offers convenient, web-based access to the router's command-line console, enabling remote administration without an SSH client.

Table 12: Administration router apps

2.5   Protocol Conversion Router Apps

App Name	Description
EdgeLink	Provides an on-device runtime for tasks configured in EdgeLink Studio. EdgeLink acts as an industrial IoT gateway, supporting over 200 protocols (Modbus, OPC UA, MQTT) to securely bridge field devices with cloud platforms like Azure, AWS, and Google Cloud.
AT Modem Emulator	Facilitates the conversion of modem-style AT commands to TCP/IP and vice versa, enabling modern IP connectivity for legacy serial devices.
DNP3 Outstation	Integrates Distributed Network Protocol 3 (DNP3) support, enabling the router to act as an outstation for data collection from industrial sensors and actuators.
Modbus Logger	Captures and logs Modbus RTU traffic on a serial line for detailed analysis and troubleshooting of industrial communication issues.
Modbus to LwM2M	Bridges Modbus devices with Lightweight M2M (LwM2M) networks, facilitating modern IoT device management for industrial equipment.
Modbus & DI/DO to IEC104	Designed to bridge Modbus TCP/RTU devices and digital I/O with IEC 104 networks. It operates as a Modbus master to poll devices and as an IEC 104 server to report data to an IEC 104 client.
Modbus to MQTT	Integrates Modbus devices with MQTT networks by converting Modbus data to MQTT messages, enabling flexible IoT communication architectures.
Operating Hours Counter	Monitors device usage with both resettable and non-resettable counters, useful for scheduling preventive maintenance based on operational hours.
Packet Splitter	Duplicates and distributes incoming data flows to multiple targets, which is useful for data logging, analysis, and redundant processing.
Protocol IEC101-104	Simplifies communication by converting the serial IEC 101 protocol to the IP-based IEC 104 protocol, facilitating the integration of legacy serial devices into modern IP networks.
Protocol ALPHA-MODBUS	Translates data from Mitsubishi ALPHA2 controllers for use on Modbus TCP networks, ensuring compatibility and integration.
Protocol DF1- Ethernet	Translates the DF1 serial protocol used by Allen-Bradley PLCs to industrial Ethernet standards, supporting legacy industrial devices.
Protocol MODBUS-RTU2TCP	Converts Modbus RTU (serial) messages to Modbus TCP (IP) messages, enabling seamless integration of serial and IP-based Modbus networks.
Protocol MODBUS-RTUMAP	Aggregates data from multiple Modbus RTU slaves into a single Modbus TCP connection, simplifying network architecture and data collection.
Protocol MODBUS-TCP2RTU	Transforms Modbus TCP messages from an IP network for communication on a serial line, allowing modern systems to control legacy serial devices.
Serial over LAN	Provides TCP/IP server access to a serial port, allowing multiple clients to connect and communicate with a serial device over the network.
Serial to TCP	Acts as a TCP/IP client to connect a local serial port to a remote TCP server, extending communication capabilities for serial devices.
Wake-on-LAN Gateway	Enables Wake-on-LAN (WoL) functionality across different network subnets, facilitating remote device power management.

Table 13: Protocol conversion router apps

2.6 Node-RED Router Apps

App Name	Description
Node-RED	A powerful, flow-based visual programming tool for integrating hardware devices, APIs, and online services.
Node-RED / AWS	Adds nodes for seamless integration with Amazon Web Services (AWS), enabling cloud-based data processing and storage.
Node-RED / Azure	Adds nodes for native integration with Microsoft's Azure IoT platform for cloud connectivity.
Node-RED / BACnet	Adds nodes to support the BACnet protocol for Building Automation and Control Networks.
Node-RED / Bluetooth	Adds nodes to support Bluetooth communication, with a focus on Bluetooth Low Energy (BLE) devices.
Node-RED / Dashboard	Enables the design and implementation of interactive, web-based user interfaces and dashboards directly within Node-RED flows.
Node-RED / DNP3	Provides nodes for integrating systems that use the Distributed Network Protocol 3 (DNP3).
Node-RED / Filesystem	Introduces a set of nodes for performing filesystem operations like reading, writing, and monitoring files.
Node-RED / FTP	Adds nodes to support both FTP (File Transfer Protocol) and SFTP (Secure File Transfer Protocol).
Node-RED / GPS	Adds nodes to access GNSS (Global Navigation Satellite Systems) location data from the router.
Node-RED / Gzip	Provides nodes for gzip compression and decompression to enable efficient data handling.
Node-RED / KNX	Adds comprehensive support for the KNX protocol, a standard in modern building automation systems.
Node-RED / LwM2M	Adds support for the OMA Lightweight M2M (LwM2M) protocol for standardized IoT device management.
Node-RED / Modbus	Adds comprehensive support for the Modbus protocol, including both Modbus TCP and Modbus RTU (serial) variants.
Node-RED / OPC UA	Provides an integrated solution for interacting with OPC UA services, offering both client and server functionalities.
Node-RED / PLC EtherNet/IP	Adds nodes for integrating with Allen Bradley/Rockwell PLCs via the EtherNet/IP protocol.
Node-RED / PLC Melsec	Adds nodes for integrating with Mitsubishi PLCs using the Melsec communication protocol.
Node-RED / Splunk	Offers robust integration with the Splunk platform for real-time data logging and operational intelligence.

Table 14: Node-RED router apps

2.7   Integration Router Apps

App Name	Description
CPE WAN Management Protocol	Implements the TR-069 standard, enabling remote management and provisioning of the router by an Auto-Configuration Server (ACS), ensuring optimal performance and seamless network administration.
Cumulocity Agent	An agent that enables seamless integration with the *Cumulocity IoT Platform* for device management and data collection.
Docker	An open platform that simplifies application development, shipping, and execution using containerization technology. See *Docker Official Site*.
VirtualHere USB Server	Turns your Advantech router into a powerful USB over IP hub, allowing you to share and access USB devices remotely over a network as if they were plugged directly into your computer. See *VirtualHere Official Site*.
WebAccess/DMP	A client app that connects the router to the WebAccess/DMP remote management platform for centralized monitoring and control. See *Advantech WebAccess/DMP*.
Zabbix Agent	An agent for the Zabbix network monitoring platform, allowing the router to be monitored as part of a larger IT infrastructure. See *Zabbix Official Site*.

Table 15: Integration router apps

2.8   Development Router Apps

App Name	Description
Advantech SDK	A comprehensive Software Development Kit for creating custom Router Apps. See the *Development* page for details.
Azure IoT SDK Python API v2	Enables Advantech routers to securely connect to Microsoft's Azure IoT platform for data exchange and device management. See *github.com/Azure/azure-iot-sdk-python*.
Python 3	Adds support for the Python 3 programming language, expanding the router's scripting and application capabilities. See *www.python.org*.
Node.js	A JavaScript runtime environment built on Chrome's V8 engine, suitable for building scalable network applications. See *nodejs.org/en/*.
LUA	Adds support for the LUA scripting language, which combines simple procedural syntax with powerful data description facilities. See *www.lua.org*.
GNU Debugger (GDB)	A powerful project debugger that allows you to see what is happening 'inside' another program while it executes, essential for software development. See *www.gnu.org/software/gdb*.

Table 16: Development router apps

3. Console Commands

This chapter highlights a selection of notable commands available in the console environment of Advantech routers. The commands are grouped into categories for easier navigation. For a complete list and detailed descriptions, please refer to the *Command Line Interface* application note.

> **Info**
>
> Some commands may not be supported on all product platforms.

System & Process Management

These commands are used for managing system-level operations, processes, and scheduled tasks.

Command	Description
crontab	Manages scheduled tasks (cron jobs) for automated command execution.
date	Displays or sets the system date and time.
dmesg	Displays kernel ring buffer messages, useful for diagnosing hardware and driver issues.
hwclock	Queries and sets the Hardware Clock (RTC) to manage persistent system time.
kill	Terminates a running process, typically identified by its Process ID (PID).
ps	Displays information about currently running system processes.
reboot	Performs a software reboot of the router.
top	Provides a real-time, dynamic view of running system processes and resource usage.

Table 17: System & process management commands

Network & Connectivity

A collection of essential tools for configuring, managing, and diagnosing network connections.

Command	Description
`arp`	Displays and modifies the system's ARP cache, which maps IP addresses to MAC addresses.
`bridge`	A utility for configuring and managing Ethernet bridges, including advanced features like VLAN filtering.
`curl`	A versatile tool for transferring data from or to a server using various protocols like HTTP and FTP.
`ether-wake`	Sends a Wake-on-LAN (WoL) 'Magic Packet' to a specific MAC address to wake up a sleeping device on the network.
`ethtool`	Displays or modifies settings of Ethernet network interfaces.
`ifconfig`	Configures and displays information about network interfaces.
`ip`	A powerful, modern tool for managing network interfaces, IP addresses, routing, and tunnels.
`iptables`	Administers the kernel's IPv4 packet filtering and NAT ruleset.
`iw`	Manages and configures wireless network devices and their settings.
`netstat`	Displays network connections, routing tables, and interface statistics.
`nslookup`	Queries Domain Name System (DNS) servers to resolve hostnames or IP addresses.
`ping`	Sends ICMP ECHO_REQUEST packets to network hosts to test connectivity and latency.
`portd`	Runs a daemon for transparent data transfer between a serial line and a TCP/UDP network.
`route`	Shows or manipulates the kernel's IP routing table.
`scp`	Securely copies files between hosts on a network using the SSH protocol.
`ssh`	Securely logs into a remote machine and executes commands over an encrypted channel.
`tc`	Manages network traffic control, including bandwidth shaping and Quality of Service (QoS).
`tcpdump`	A powerful command-line packet analyzer that captures and displays network traffic.
`traceroute`	Traces the network path that packets take to a remote host.

Table 18: Network & connectivity commands

Hardware & Status Control

Commands for interacting with router-specific hardware components and retrieving status information.

Command	Description
gsmat	Sends an AT command directly to the cellular module for diagnostics and configuration.
io	Reads the state of digital inputs and controls the state of digital outputs.
led	Controls the state (on, off, or blinking) of the router's user-programmable USR LED.
lpm	Manages the router's Low Power Mode, putting it to sleep to conserve energy.
report	Generates a comprehensive diagnostic report containing system status, logs, and configuration.
sms	Sends an SMS message from the command line using the cellular module.
status	Displays the current status of the router's interfaces (Mobile, LAN, Wi-Fi) and system.
tpm2	Provides tools for interacting with the Trusted Platform Module (TPM 2.0) chip for secure cryptographic operations. Available only on routers equipped with TPM hardware.

Table 19: Hardware & status control commands

File & Configuration Management

Tools for managing files, filesystems, and the router's software and configuration.

Command	Description
cat	Concatenates and displays the content of files, often used for viewing text files.
fwupdate	Manages and applies firmware updates for the router.
grep	Searches for specific text patterns within files or command output, essential for log analysis.
mount	Mounts a storage device or filesystem to a specific location in the directory tree.
openssl	A command-line toolkit for the Transport Layer Security (TLS) and Secure Sockets Layer (SSL) protocols, used for various cryptographic tasks and certificate management.
restore	Restores the router's configuration from a backup file.
shred	Securely deletes files from non-volatile memory by overwriting them multiple times to prevent data recovery.
tar	Creates, views, and extracts tar archives, useful for bundling files.
umount	Unmounts a mounted filesystem from the directory tree.
umupdate	Adds or deletes a user module (Router App) from the command line.
vi	A standard, powerful text editor for creating or modifying files from the console.
wget	A non-interactive tool for downloading files from the web via HTTP, HTTPS, and FTP.

Table 20: File & configuration commands

4. Related Documents

You can obtain product-related documents on the **Engineering Portal** at *icr.advantech.com*.

To access your router's documents or firmware, go to the *Router Models* page, locate the required model, and select the appropriate tab.

Documents that are common to all models and describe specific functionality areas are available on the *Application Notes* page.

The **Router Apps** installation packages and manuals are available on the *Router Apps* page.

For further options on extending router functionality, either through scripts or custom Router Apps, please see the information available on the *Development* page.