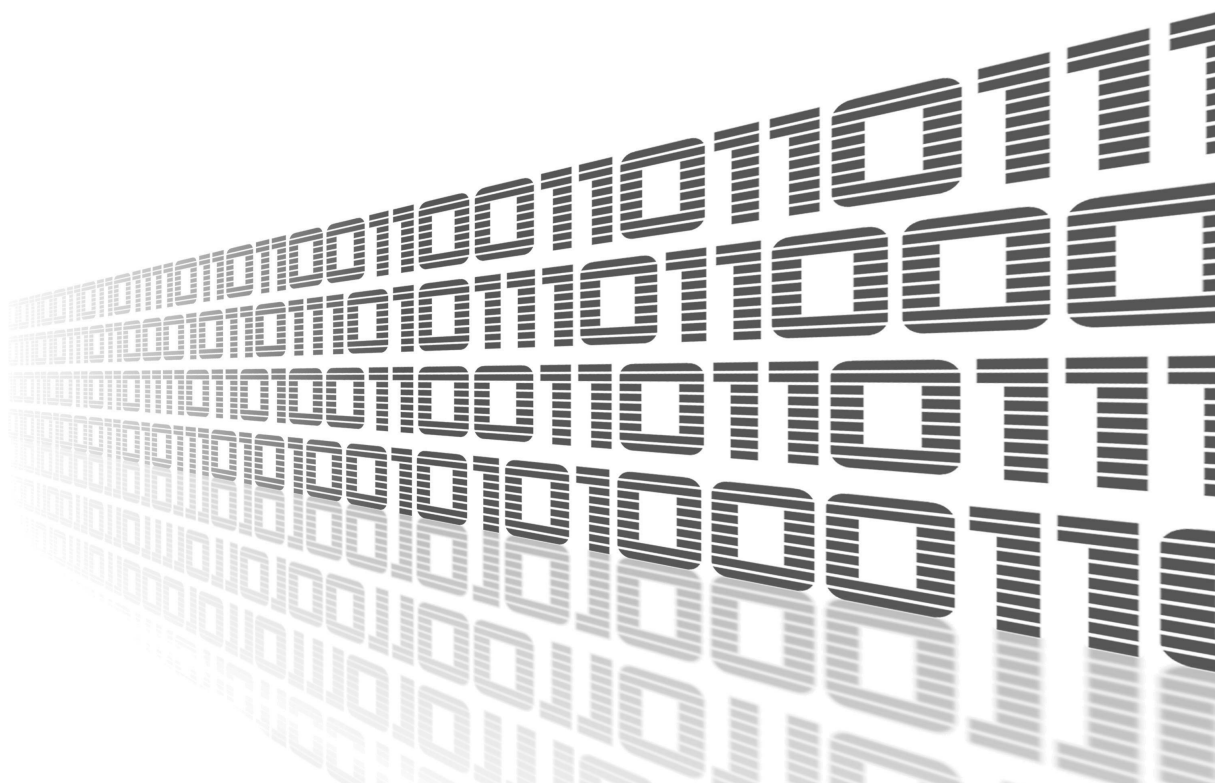




User Module

FRR

APPLICATION NOTE



ADVANTECH

Used symbols



Danger – Information regarding user safety or potential damage to the router.



Attention – Problems that may arise in specific situations.



Information or notice – Useful tips or information of special interest.



Example – example of function, command or script.



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1. Introduction



This user module is not installed on *Advantech* routers by default. See *Configuration Manual* for the description how to upload a user module to the router. For more information see the *Configuration manual*, chapter *Customization* → *User Modules*.



The user module is v2, v3 and v4 router platforms compatible.

FRRouting (FRR) is an IP routing protocol suite for Linux and Unix platforms which includes protocol daemons for BGP, IS-IS, LDP, OSPF, PIM, and RIP.

2. Web Interface

Once the installation of the module is complete, the module's GUI can be invoked by clicking the module name on the User modules page of router's web interface.

Left part of this GUI contains menu with Status menu section, Configuration menu section and Information menu section. Customization menu section contains only the Return item, which switches back from the module's web page to the router's web configuration pages. The main menu of module's GUI is shown on Figure 2.

Status
Overview
System Log
Configuration
Global
Zebra
BGP
ISIS
OSPF
OSPF6
RIP
RIPNG
NHRP
Information
Licenses
Customization
Return

Figure 1: Menu

3. Configuration

3.1 Global

All Secure Syslog user module settings can be configured by clicking on the *Global* item in the main menu of module web interface. An overview of configurable items is given below.



GLOBAL Configuration

☒ Enable GLOBAL

Log Level Emergency

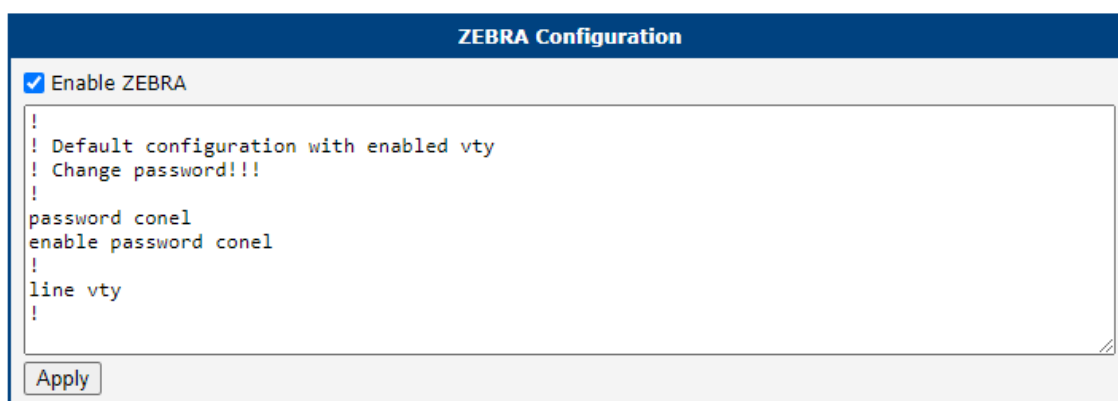
Figure 2: Global Configuration

Item	Description
Enable GLOBAL	Enables FRR functionality.
Log Level	Select what level of information will appear in log

Table 1: GLOBAL Configuration items description

3.2 Zebra

Zebra is an IP routing manager. It provides kernel routing table updates, interface lookups, and redistribution of routes between different routing protocols. More about configuring and examples can be found in BGP Application note [7] or in the FRR documentation¹.



ZEBRA Configuration

☒ Enable ZEBRA

```
!
! Default configuration with enabled vty
! Change password!!!
!
password conel
enable password conel
!
line vty
!
```

Figure 3: Zebra Configuration

¹<http://docs.frrouting.org/en/latest/zebra.html>

3.3 BGP

Border Gateway Protocol (BGP) is a standardized exterior gateway protocol designed to exchange routing and reachability information between autonomous systems (AS) on the Internet. More about configuring and examples can be found in BGP Application note [7] or in the FRR documentation².

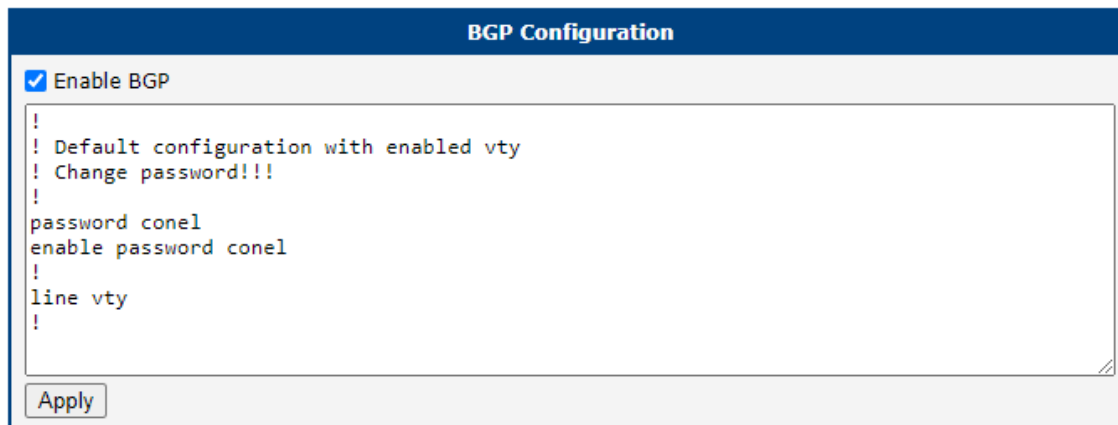


Figure 4: BGP Configuration

3.4 ISIS

IS-IS (Intermediate System – Intermediate System) is routing protocol, which is designed for the exchange of routing information between routers. More about this protocol and examples can be found in [8] or in the FRR documentation³.

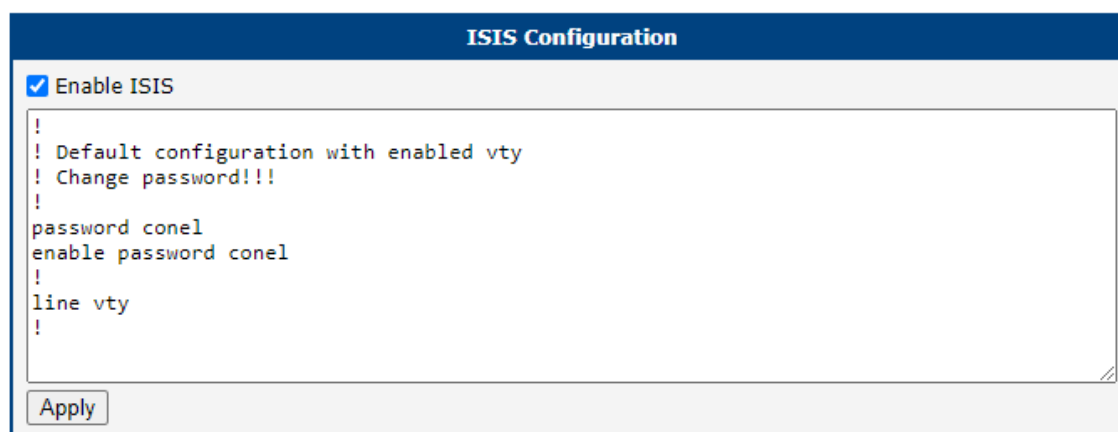


Figure 5: IS-IS Configuration

²<http://docs.frrouting.org/en/latest/bgp.html>

³<http://docs.frrouting.org/en/latest/isisd.html>

3.5 OSPF

OSPF protocol is designed for exchanging routing information within an autonomous system. The OSPF is a link state protocol, which means that routers maintain a map of the network (link state database) that is updated after any change to the network topology. To compute the shortest (least cost) path between the router and all the networks is used Dijkstra's algorithm. Then these data are filled in the routing table. More about this protocol and examples can be found in [9] or in the FRR documentation⁴.

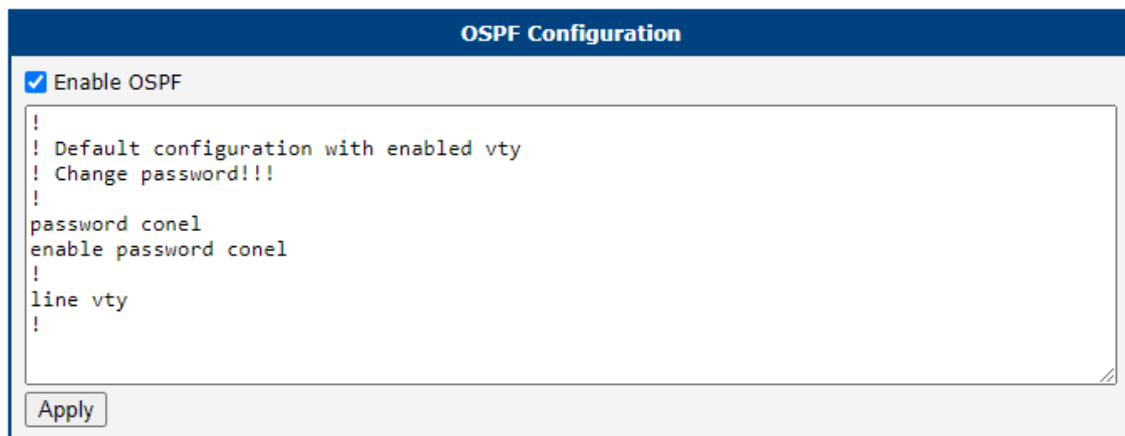


Figure 6: OSPF Configuration

3.6 OSPF6

OSPF6 is IPv6 version of OSPF. More about this protocol and examples can be found in [9] or in the FRR documentation⁵.

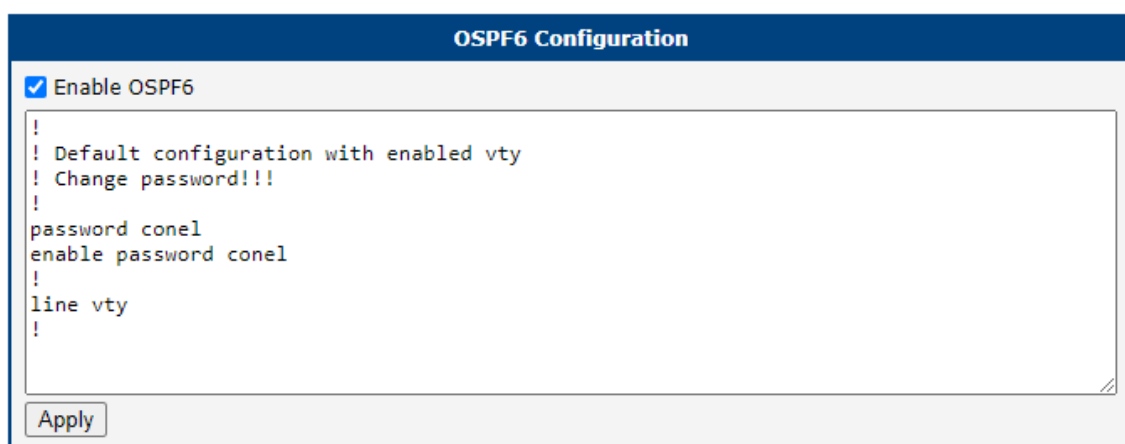


Figure 7: OSPF6 Configuration

⁴<http://docs.frrouting.org/en/latest/ospfd.html>

⁵<http://docs.frrouting.org/en/latest/ospf6d.html>

3.7 RIP

RIP allows the routers to communicate with each other and react to changes in network topology. The RIP is a distance-vector protocol, which means that routers send each other updated routing tables (don't know the entire network topology). More about this protocol and examples can be found in [10] or in the FRR documentation⁶.

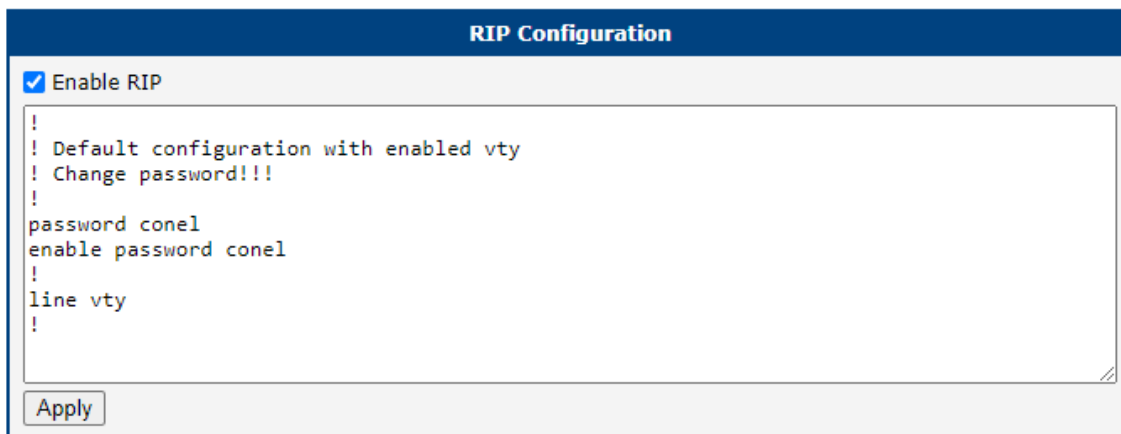


Figure 8: RIP Configuration

3.8 RIPNG

RIPNG is IPv6 version of RIP. More about this protocol and examples can be found in [10] or in the FRR documentation⁷.

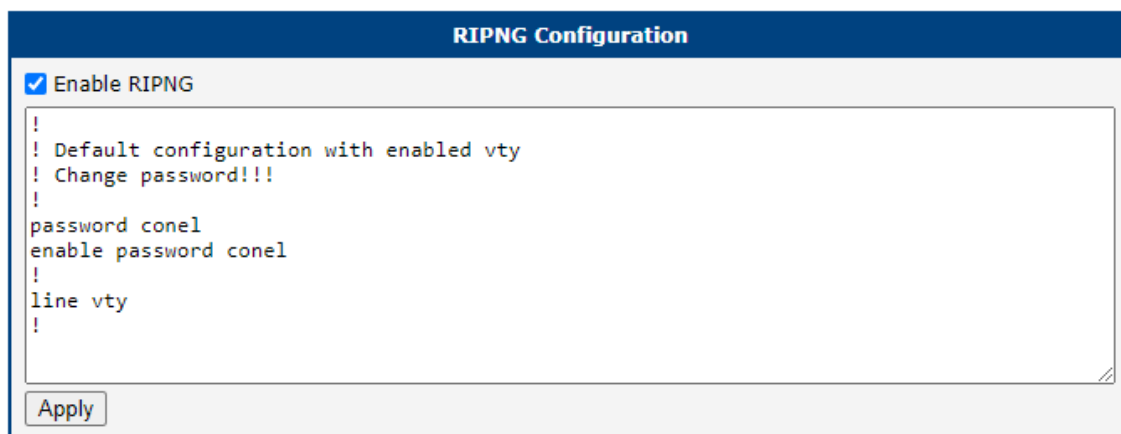


Figure 9: RIPNG Configuration

⁶<http://docs.frrouting.org/en/latest/ripd.html>

⁷<http://docs.frrouting.org/en/latest/ripngd.html>

3.9 NHRP

The Next Hop Resolution Protocol (NHRP) is an extension of the ATM ARP routing mechanism that is sometimes used to improve the efficiency of routing computer network traffic over Non-Broadcast, Multiple Access (NBMA) Networks. It can be used by a sender to determine a route with the fewest hops to a receiver. More about this protocol and examples can be found in [11] or in the FRR documentation⁸.

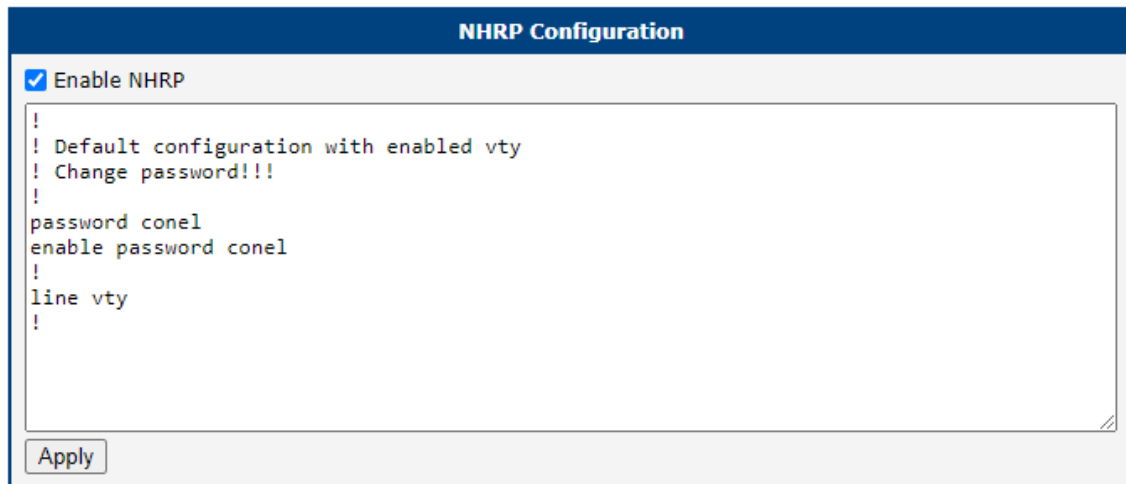


Figure 10: NHRP Configuration

⁸<http://docs.frrouting.org/en/latest/nhrpd.html>

4. Status

In this section you can see status of all protocols which can be configured via FRR. In this case Zebra protocol is running.

```

Status Overview

-----
Services
-----

Protocol zebra is running
-----

FRRouting 7.5 (Router).
Router# show ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
        O - OSPF, I - IS-IS, B - BGP, E - EIGRP, N - NHRP,
        T - Table, v - VNC, V - VNC-Direct, A - Babel, D - SHARP,
        F - PBR, f - OpenFabric,
        > - selected route, * - FIB route, q - queued, r - rejected, b - backup

K>* 0.0.0.0/0 [0/0] via 192.168.253.254, usb0, 00:05:02
C>* 10.64.0.0/22 is directly connected, eth0, 00:05:02
C>* 10.65.0.0/22 is directly connected, eth1, 00:05:02
C>* 10.80.0.85/32 is directly connected, usb0, 00:05:02
K>* 192.168.253.254/32 [0/0] is directly connected, usb0, 00:05:02
Router# show ipv6 route
Codes: K - kernel route, C - connected, S - static, R - RIPng,
        O - OSPFv3, I - IS-IS, B - BGP, N - NHRP, T - Table,
        v - VNC, V - VNC-Direct, A - Babel, D - SHARP, F - PBR,
        f - OpenFabric,
        > - selected route, * - FIB route, q - queued, r - rejected, b - backup

C>* 64:ff9b::/96 is directly connected, nat64, 00:05:02
C>* fd00:a40::/56 is directly connected, eth0, 00:05:02
C>* fd00:a41::/56 is directly connected, eth1, 00:05:02
C * fe80::/64 is directly connected, nat64, 00:05:02
C * fe80::/64 is directly connected, eth1, 00:05:02
C>* fe80::/64 is directly connected, eth0, 00:05:02
-----

```

Figure 11: Status overview

5. Licenses

Summarizes Open-Source Software (OSS) licenses used by this module.

FRRouting Licenses		
Project	License	More Information
c-ares	MIT	License
frr	GPL 2	License
json-c	Json-c	License
libyang	Libyang	License
pcre	PCRE	License

Figure 12: Licences

6. Related Documents

- [1] Advantech Czech: **v2 Routers Configuration Manual** (MAN-0021-EN)
- [2] Advantech Czech: **SmartFlex Configuration Manual** (MAN-0023-EN)
- [3] Advantech Czech: **SmartMotion Configuration Manual** (MAN-0024-EN)
- [4] Advantech Czech: **SmartStart Configuration Manual** (MAN-0022-EN)
- [5] Advantech Czech: **ICR-3200 Configuration Manual** (MAN-0042-EN)
- [6] Advantech Czech: **Remote Monitoring Guide** (APP-0091-EN)
- [7] Advantech Czech: **BGP Application Note** (APP-0054-EN)
- [8] Advantech Czech: **IS-IS Application Note** (APP-0055-EN)
- [9] Advantech Czech: **OSPF Application Note** (APP-0058-EN)
- [10] Advantech Czech: **RIP Application Note** (APP-0060-EN)
- [11] Advantech Czech: **DMVPN Application Note** (APP-0052-EN)



Product-related documents can be obtained on *Engineering Portal* at icr.advantech.cz address.