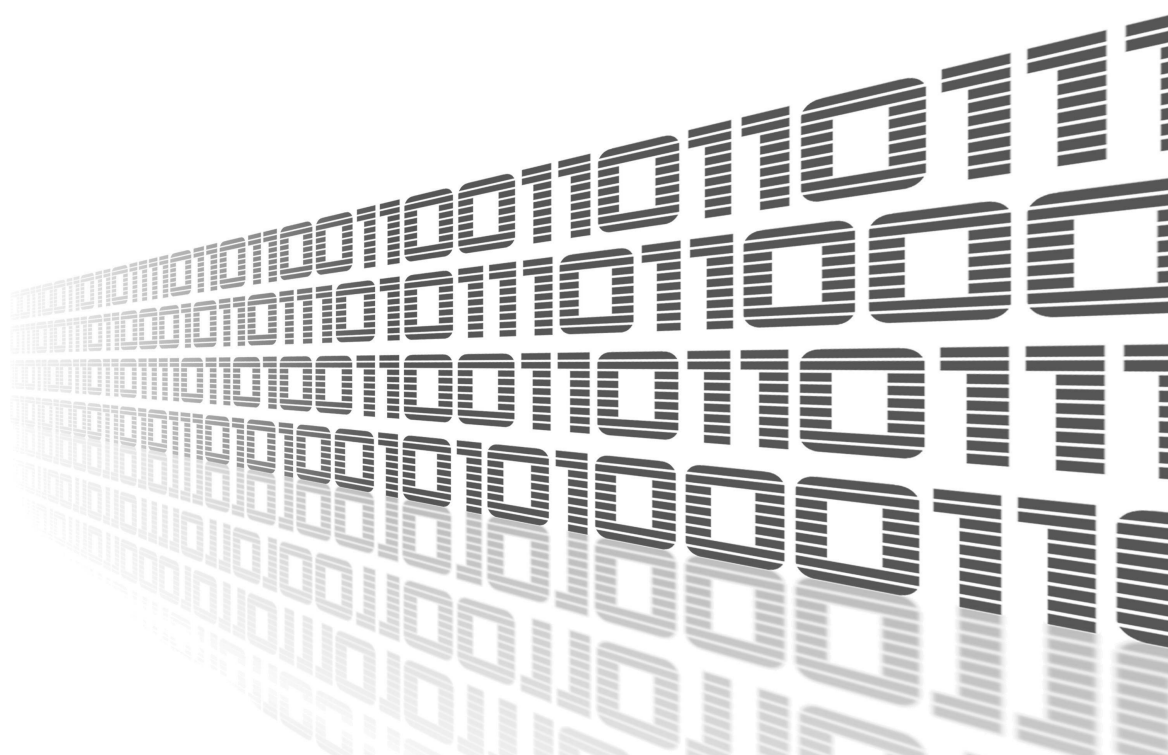




User Module

DF1 – Ethernet

APPLICATION NOTE



Used Symbols



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



Attention – Problems that can arise in specific situations.



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



Advantech Czech s.r.o., Sokolska 71, 562 04 Usti nad Orlici, Czech Republic
Document No. APP-0051-EN, revised on June 18, 2020. Released in the Czech Republic.

Contents

| | | |
|----------|---|----------|
| 1 | Introduction | 1 |
| 1.1 | User Module <i>DF1 – Ethernet</i> | 1 |
| 1.2 | DF1 Protocol | 1 |
| 1.3 | AB CSPv4 Protocol | 2 |
| 1.4 | EtherNet/IP Protocol | 2 |
| 2 | Configuration | 3 |
| 2.1 | System Log | 5 |
| 2.2 | EDS File | 5 |
| 3 | Related Documents | 6 |

List of Figures

| | | |
|---|--------------------------------|---|
| 1 | Communication Scheme | 1 |
| 2 | Configuration Form | 3 |
| 3 | System Log | 5 |

List of Tables

| | | |
|---|--|---|
| 1 | DF1 Protocol Configuration | 4 |
| 2 | CSPv4 Protocol Configuration | 4 |
| 3 | EtherNet/IP Protocol Configuration | 4 |

1. Introduction

1.1 User Module *DF1 – Ethernet*

The *DF1 – Ethernet* user module provides conversion of *DF1* protocol running on the serial line to the *AB CSPv4* protocol and *EtherNet/IP* protocol – these run over Ethernet. If you have a v2 platform router, it is possible to use the expansion port RS232 or expansion port RS485/422 as a serial line. Both of these ports can be fitted in PORT1 or PORT2. The user module supports automatic detection of serial ports. If the *DF1 – Ethernet* user module is used on v3 platform, it is necessary to have a v3 router with either an RS232 or an RS232-RS485/422 interface. Only full duplex *DF1* communication is supported and a single device can communicate via *DF1* with the router. In the user module web interface you can enable and configure the specific settings and protocols (*CSPv4* and *EtherNet/IP* can be both enabled at the same time) and save the EDS file for your dispatching SCADA software.

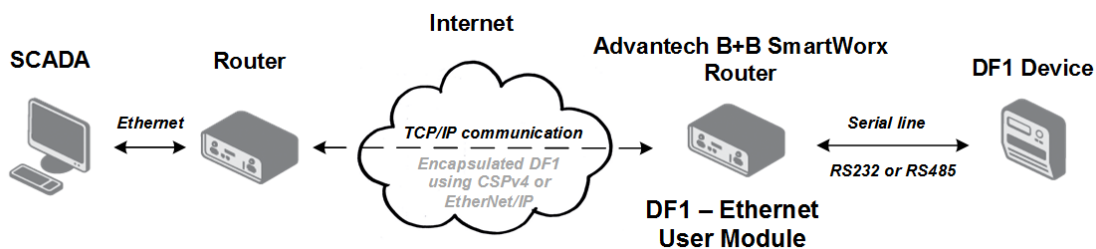


Figure 1: Communication Scheme



User module *DF1 – Ethernet* is not included in the standard router firmware. Uploading of this user module is described in the Configuration manual (see [1, 2]).



The user module is primarily intended for v2 routers. However, it is also v3 platform compatible.

1.2 DF1 Protocol

DF1 protocol is an open and freely available protocol developed by Allen-Bradley (A line of Factory Automation Equipment manufactured by Rockwell Automation). It is a data-link layer protocol that combines features of subcategories D1 (data transparency) and F1 (two-way simultaneous transmission with embedded responses) of ANSI x3.28 specification. The link layer serial frame is a composition of a conventional RS232 serial frame with the parameters specified as 8 data bits, no parity, and a maximum baud rate of 19200. There is no guarantee commands will be received in the same order they were sent.

Only full duplex DF1 communication is supported by the *DF1 – Ethernet* user module. DF1 full duplex is used over a point-to-point link (one device connected to another). This allows for simultaneous bi-directional communications and produces higher throughput for high performance applications. Half-duplex for master-slave multi-drop communication is not supported by the user module.

1.3 AB CSPv4 Protocol

AB CSPv4 Protocol (Allen Bradley Client Server Protocol v4) also known as AB Ethernet uses IP addressing and TCP/IP to carry PCCC commands. This protocol is similar to DF1 except it uses Ethernet instead of RS232. It's a good choice for non-routed communications with a low communications overhead (though routing via TCP/IP can also be used).

1.4 EtherNet/IP Protocol

EtherNet/IP is an industrial Ethernet network that combines standard Ethernet technologies with the media-independent Common Industrial Protocol or "CIP." The CIP protocol can carry PCCC commands – Programmable Controller Communication Commands described in the *DF1 Protocol and Command Set Manual*, publication 1770-6.5.16, and the *Logix Data Access Reference Manual*, publication 1756-RM005A-EN-E – both are available for download from the www.ab.com website.



Encapsulation of PCCC messages in CIP protocol is supported only by the user module (PCCC in CIP supported).

2. Configuration

For configuration of the *DF1 – Ethernet* user module a web interface is available, which can be accessed by selecting the module name on the *User Modules* page of the router web interface. The menu on the left of the web interface contains the following items: *Configuration*, *System Log*, *EDS File* and *Return*. *Return* switches from this web interface to the interface of the router. Configuration form can be accessed by selecting *Configuration* from the menu.

DF1 - Ethernet

Figure 2: Configuration Form

The configuration form is divided to three parts according to particular protocols. The configuration items are explained in the three tables below:

| Item | Description |
|---------------------------------------|--|
| Enable DF1 protocol on expansion port | Activate the DF1 serial communication on the port set below. |
| Expansion port | Port on which connection will be established: <ul style="list-style-type: none"> • PORT1 – Establishes connection on PORT 1 • PORT2 – Establishes connection on PORT 2 |
| Baudrate | Applied communication speed (19200 by default). |
| Data Bits | Number of data bits (8 by default). |

Continued on next page

Continued from previous page

| Item | Description |
|---------------|--|
| Parity | Parity checking refers to the use of parity bits to check that data has been transmitted accurately: <ul style="list-style-type: none"> • none – No parity will be sent • even – Even parity will be sent • odd – Odd parity will be sent |
| Stop Bits | Number of stop bits (1 by default). |
| Split Timeout | If the communication is interrupted in the middle of a defined frame, the system waits for a given time for communication to resume. If the end of the frame does not come during this timeout (e.g. cable disconnected), the frame is dropped and the start of the new frame is awaited. Default is 200 ms. |

Table 1: DF1 Protocol Configuration

The CSPv4 and EtherNet/IP protocols can both be enabled at the same time. Packets in both protocol formats are sent via Ethernet interface.

| Item | Description |
|-----------------------|---|
| Enable CSPv4 protocol | Activate CSPv4 communication on the Ethernet interface. |
| TCP Port | TCP port on which the router listens for requests for connection. |

Table 2: CSPv4 Protocol Configuration

| Item | Description |
|-----------------------------|---|
| Enable EtherNet/IP protocol | Activate EtherNet/IP communication on the Ethernet interface. |
| TCP Port | The TCP port on which the router listens for requests for connection. |
| DF1 Destination Address | Address of a device connected to the serial interface. |
| DF1 Source Address | Any address different from the destination address. This address is not relevant – it can be a random number. |
| DF1 Timeout | Interval to wait for the answer from the serial DF1 communication side. |

Table 3: EtherNet/IP Protocol Configuration

All changes in settings will be applied after pressing the *Apply* button.

2.1 System Log

In the case of any connection problems it is possible to view the system log by selecting the *System Log* menu item. In this window, detailed reports from the individual applications running in the router are displayed. The activity of the *DF1 – CSPv4* user module is recorded in rows starting with "abcsp2df1". To save this log to a connected computer, press the *Save Log* button. The second button – *Save Report* – is used for creating detailed report (this generates all of the required information for technical support saves this in one file).

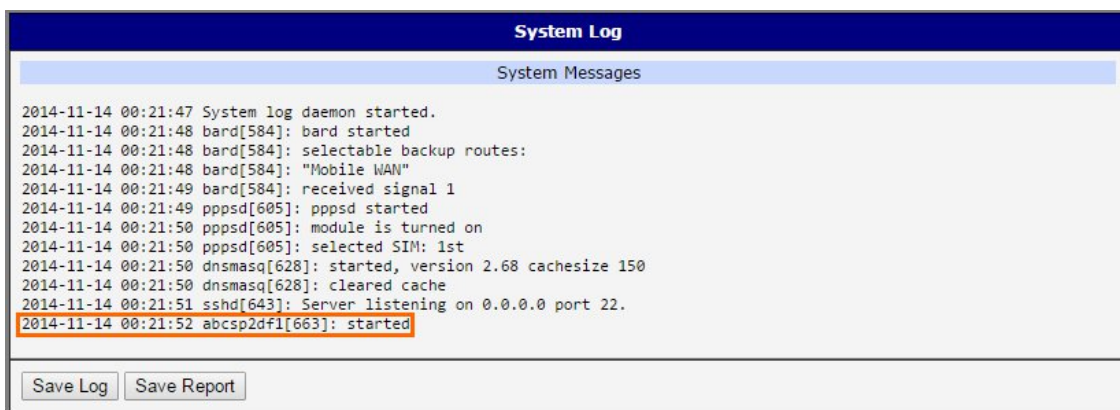


Figure 3: System Log

2.2 EDS File

Select the *EDS File* menu item to download the EDS file with the description of the router with the *DF1 – Ethernet* user module. You can import this into your dispatching software on SCADA. EDS files are simple text files used by network configuration tools to help you identify products and easily commission them on a network.

3. 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: **Expansion Port RS232 – User Manual**
(MAN-0020-EN)
- [7] Advantech Czech: **Expansion Port RS485/422 – User Manual**
(MAN-0025-EN)



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