

SFE: White Paper

What is SFE?

StarBus-for-Ethernet works like a standard telephone modem, but instead of sending your data through switches at the phone company, it uses your own Ethernet cable to share two or more serial ports. It also offers lot's of added features...

You're already familiar with a telephone modem. It provides a point-to-point connection for two RS-232 devices by tying together your local and remote ports through a low speed dial-up telephone connection.

The classic StarBus lets you attach RS-232 devices to a shared pair of wires in parallel-multidrop configuration. Each PC, terminal, printer, modem or controller along the shared wires can initiate a point-to-point link - or even broadcast to a group of remote ports; not just one-to-many, but *each to any or many!* ...all multiplexed onto a single pair of cheap home-grade wire. It's like a phone system for data, but because each port is also a multiplexer, there's no central switch or server. Each device can be set to any speed or even handshake-off without slowing throughput of the shared wire pair.

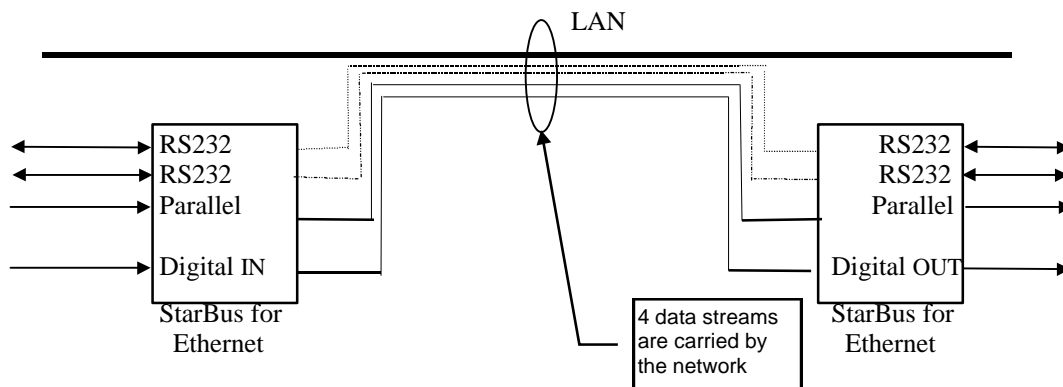
Similarly, StarBus-for-Ethernet connects serial and even parallel ports across a shared bus, but in this case, the medium is your Ethernet network, which can now be used for general data transport tasks without interfering with normal network operations. StarBus for Ethernet uses IP protocols to ensure your data connections are routable, rugged and efficient.

Using StarBus for Ethernet is much like using modems or classic StarBus, except that it uses your Ethernet network rather than the telephone company (like modems), or over a dedicated wire pair (like classic StarBus).

<i>Modem</i>	<i>StarBus</i>	<i>StarBus for Ethernet</i>
Plug into phone socket	Attach to a dedicated pair of wires	Plug into a new or existing Ethernet
Enter phone number	Enter name, address, or group no.	Enter IP number of a remote SFE
Send and receive data	Send and receive data	Send and receive data
Hang up	Disconnect or pre-set timeout	Disconnects automatically

SFE comes standard with two RS232 ports and a printer port, so its like having three modems in one box. You may connect as many SFEs as you wish and establish connections between units with unprecedented flexibility.

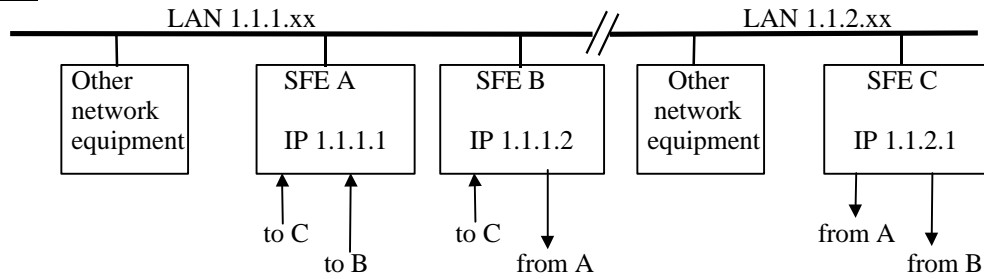
A simple example is shown in the diagram below, with two units connected to a local area network. Connections can be made between the ports as shown, and StarBus for Ethernet will transfer all four streams of data simultaneously -



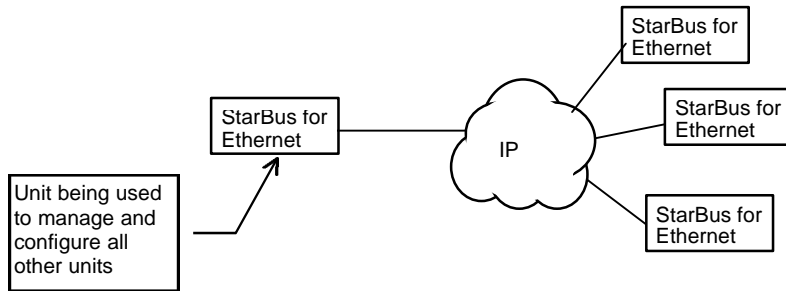
A more realistic requirement may involve more than two SFEs and a wide area network environment. Once you assign SFE an IP address it can be PINGed, configured and monitored from anywhere on your network, or linked in data connections from unit to unit and port to port. The diagram shows a network of two LANs connected by routers / bridges or whatever. The three SFEs are assigned IP numbers, according to the LAN segment, and connections are made from unit to unit and port to port with complete freedom. Some example connections are shown -

SFE: White Paper

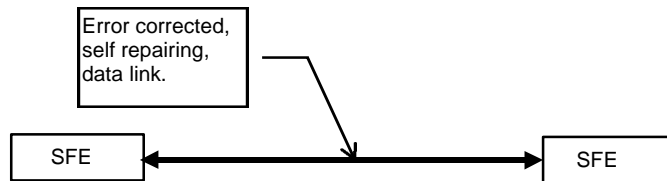
WAN



SFE allows you to make and break connections between units, examine and change configurations, unit names, IP numbers etc. of any SFE on the network. Security is provided by a password for each unit.



SFE provides error corrected, self repairing logical links. Every network packet is error checked and sequence numbered to ensure all your data is delivered and is error free. Should the network or the power fail, the SFEs will automatically re-link when the problem is resolved. To keep network loading to a minimum, SFE only passes packets to the network when there is data to be forwarded.



The next section describes StarBus for Ethernet / Mark III, which offers optional advanced features ...

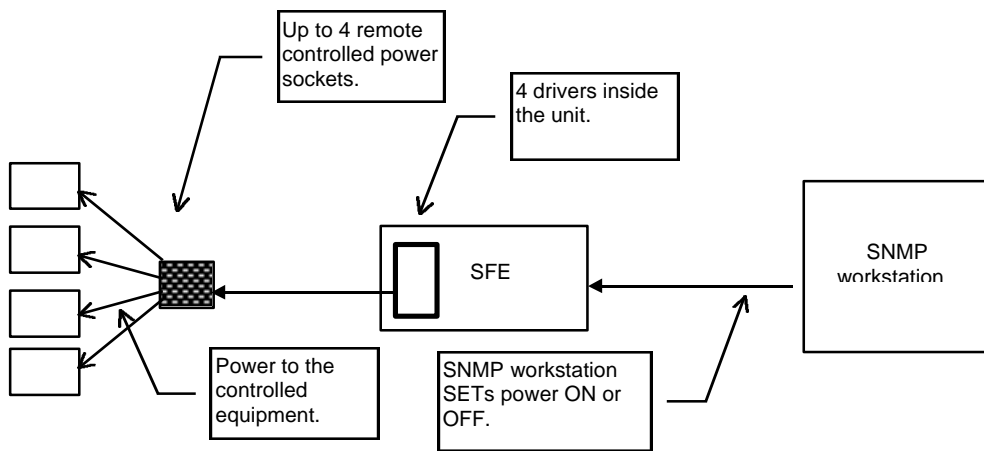
StarBus for Ethernet: Advanced feature options

In its basic configuration, StarBus for Ethernet connects up to three serial and parallel devices across any Ethernet using either user-assigned names, or IP addressing. Most customers order the base model, specifying only the power requirement (110 or 220v), and which network interface they prefer (up to two can be installed: 10B-T/UTP, 10B-2/BNC, 25-pin/AUI).

During its first two years, SFE has undergone significant improvements in performance and flexibility. For this reason, IMCO offers free upgrades to v1.39 if you have earlier firmware. Now, more advanced features are possible with custom hardware configurations. Principal among these are temperature and humidity measurement, remote controlled power, and local processing of inputs, making it ideal for alarm and environmental management duties in unattended locations.

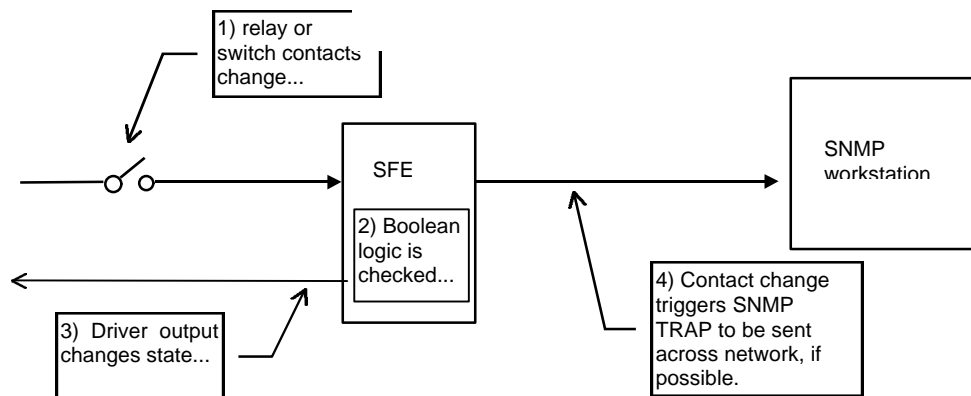
Remote Controlled Power

Using SNMP, the optional 4 drivers can be turned off and on to control power to other equipment -



Local processing

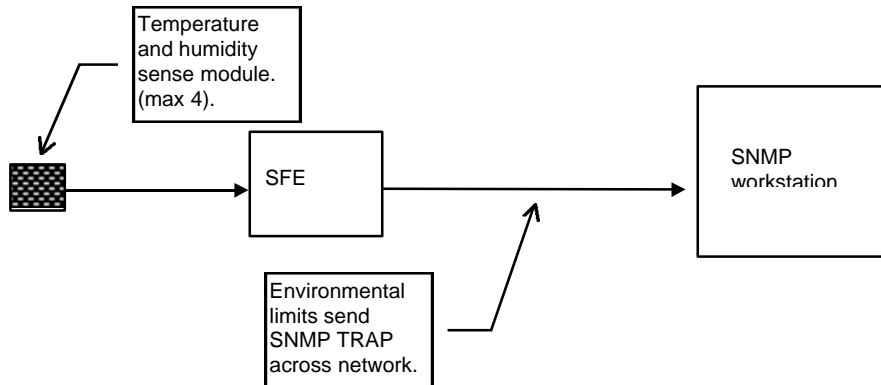
SFE can be configured to perform local processing. For example, if certain contact inputs change state, the unit will change the state of its driver outputs. For example, if an over-temperature relay closes, SFE can be set to turn on a fan. This local processing avoids dependence on the network. AND and OR Boolean logic combinations can be set up.



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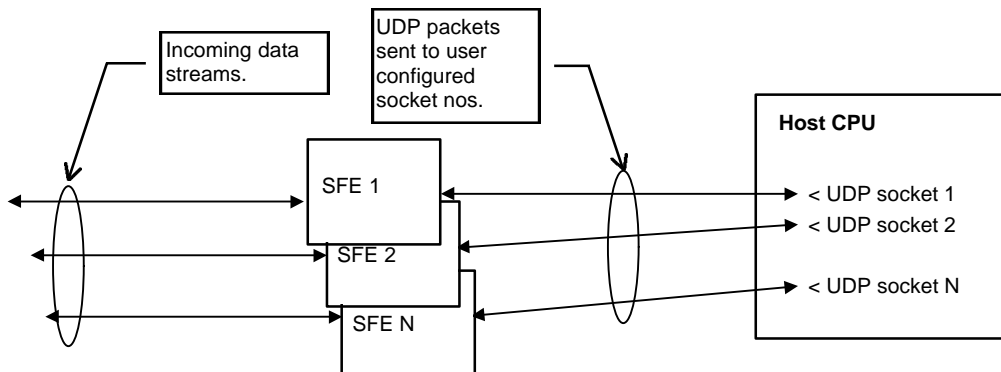
Temperature and humidity measurement

The SNMP workstation can be used to monitor the temperature and humidity at the remote location. In addition the unit can be configured to send SNMP alarms when analogue inputs exceed set limits.



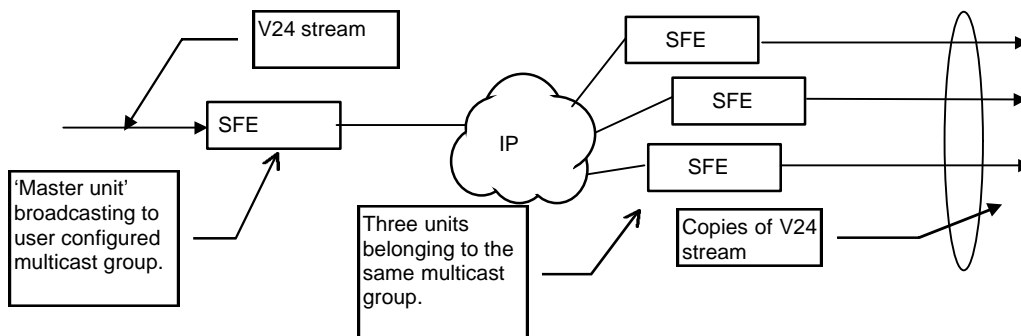
Make a link to a UDP socket in your host computer

This new link option allows a direct data link to a UDP socket in the host computer, and avoids the need to use a second SFE at the host end of the link.



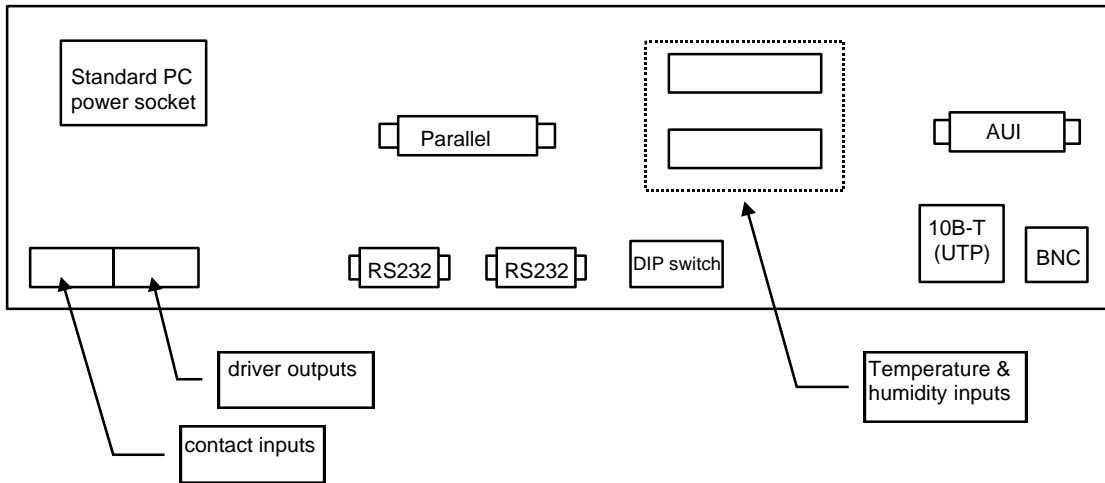
IP Multicasting

SFE has long provided Ethernet multicasts, so that for example a V24 data stream can be broadcast to many devices. The limitation is that all the SFEs must be on the same subnet. Now we are adding IP multicasting and full IGMP (level 2) support, to allow you to broadcast to devices anywhere on your WAN -



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SFE Rear Panel, shown with optional TTL-I/O and Temp/Humidity features



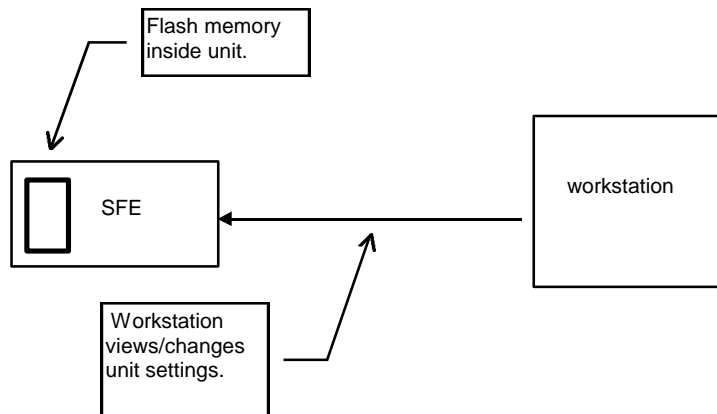
RECAP: Recently added features (#3~6 are hardware options)

StarBus for Ethernet supports these custom features, which are available by special order –

1. Embedded commands allows links to be made and changed, just like the classic StarBus
2. New data packet send settings help ensure compatibility with attached equipment.
3. SNMP management and alarms.
4. Software upgrade by TFTP.
5. PC/SFE – This software allows a PC to monitor and control all your remote SFEs anywhere on your LAN or wide area network. We offer two versions. One of these turns your Ethernet-equipped PC into a *StarBus for Ethernet!*
6. Digital I/O port links, allows remote equipment to be switched on and off and mirror remote contacts.

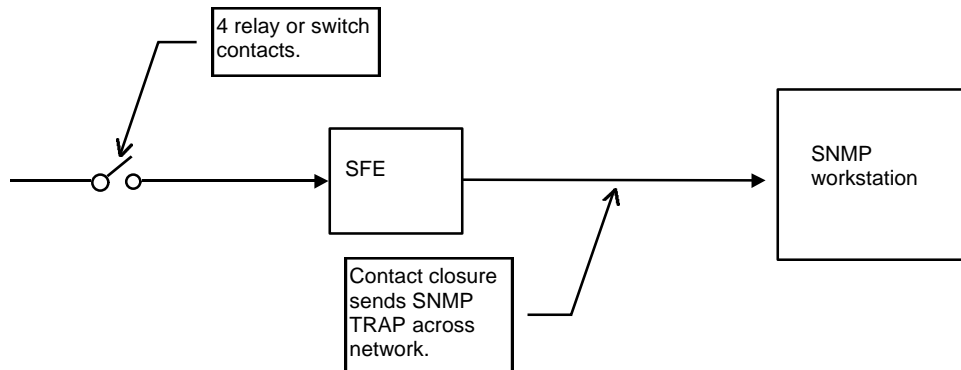
SNMP management

All SFE user settings (Connections, IP numbers, name, serial port speeds, etc) can now be monitored and set using SNMP software such as HP Openview.

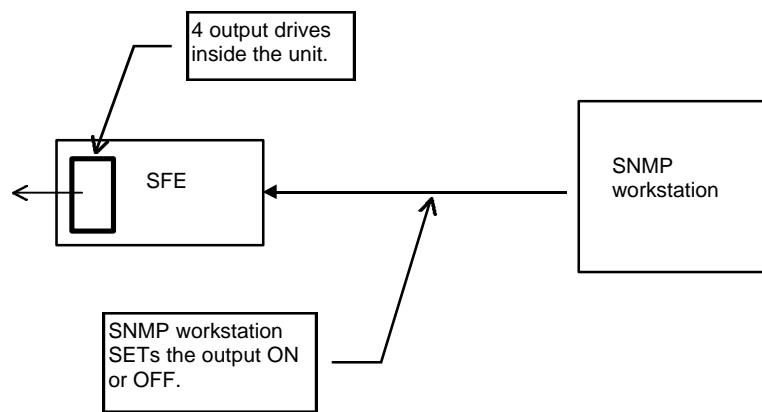


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In addition SFE with Digital I/O option can be configured to send SNMP alarms when digital inputs change state, allowing the unit to be used for alarm management.

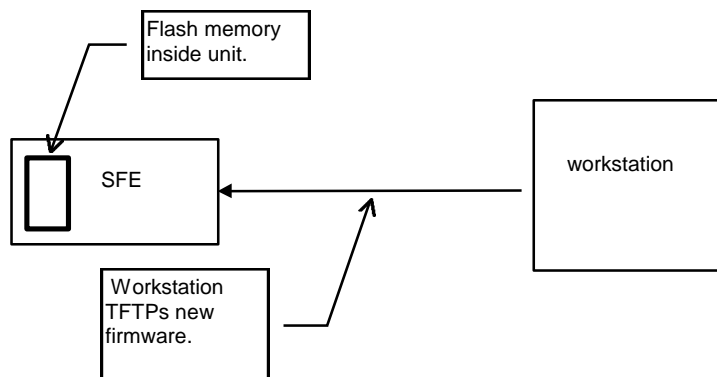


Using SNMP, the outputs can be set or reset. E.g. reset or power cycle a remote system -



Software upgrade by TFTP

Simple upgrade of SFE software is accomplished by using TFTP (a simple version of FTP) to send the upgrade firmware to any IP number. SFEs fitted with this option have flash memory and checksum routines to ensure that only checked firmware is programmed into the unit -



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PC / SFE

If you do not use SNMP you can still use your PC to manage a StarBus network. PC / SFE requires only a LAN card with a packet driver. This allows you to perform SFE configuration and link management tasks from your desk. Remember - you can manage any unit that you can ping.

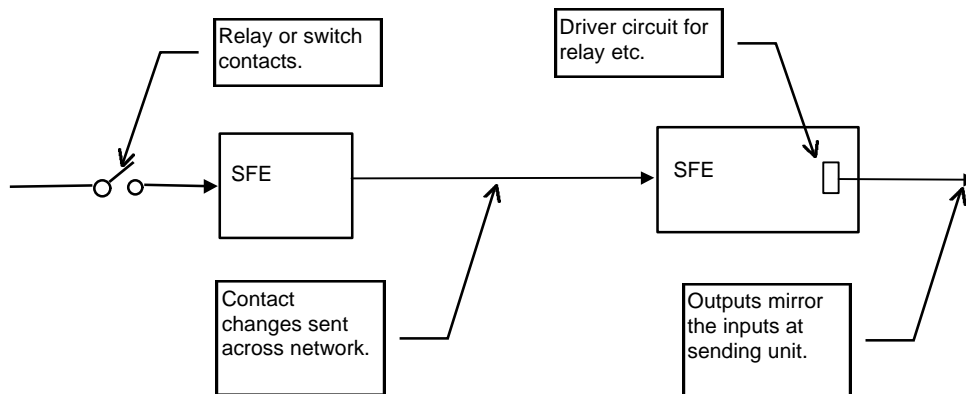
Embedded Commands

Embedded command strings allow the unit to make and break links between SFEs by entering simple strings into the RS232 ports. They are principally intended to be used in automated environments where the normal user interface is not appropriate.

To ensure that your data is not interpreted by the unit as commands, all commands begin with a user selected 'arming string' of between 1 and ten characters that will not occur naturally in your data. For example, suppose you have selected `!*$%` as your arming string, send `!*$% C1.2.3.4P1`, to make a link to port 1 on the SFE with IP number 1.2.3.4.

Digital I/O Port Links

The user can link the four inputs on one unit to the outputs on another, so that the states of the local outputs reflect the states of the remote inputs and vice versa. For example, switch remote equipment on and off by pressing a local switch, and monitor the states of remote contacts locally.



Data Packet Send Settings

SFEs are often used with automated equipment where data timings can be significant. New data packet send settings allow you to tune the data flow to meet these requirements. Three Four settings are available -

- ◆ Time to send packet (since last data packet sent) *This setting can minimize your overall Ethernet transport delay*
- ◆ " " (since last RS-232 char input) *Reduce net overhead, if gaps in outbound characters are expected*
- ◆ Number of characters to trigger packet-send *Useful in systems carrying data formatted to fixed length records*
- ◆ RS-232 output character pacing *Helpful when connecting to equipment that cannot tolerate a continuous stream of data, or cannot handshake its serial port*