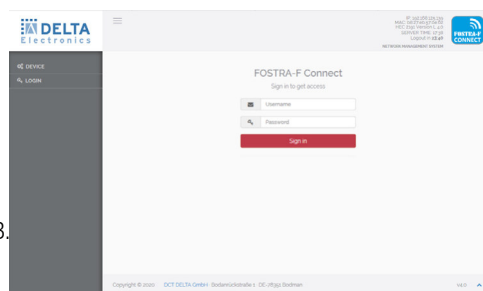


DELTANET OVERVIEW - DELTA'S SMART REMOTE CONTROL SOLUTION

- DELTANET – the smart way of collecting and getting device specific information during the installation of your network, resulting automatically in an installation topography overview with automatic cross checks and controlling your FTTx and HFC cable devices from DCT DELTA via our FSK receiver (FOSTRA-F). On site configuration of Delta devices via WLAN access.
- DELTANET consists of three applications, DELTANET FOSTRA-F (together with the HEC unit), DELTANET SCANAPP and DELTANET CONFIGAPP which can operate independent or jointly in a system:
- DELTANET FOSTRA-F: The smart approach for the demand of a robust remote control tool for ingress management and others functions (depending on device type)
- DELTANET SCANAPP: The mobile device based app (available for Android and iOS) supports you during the installation of your network. It registers your nodes / amps online with the help of QR codes (collecting data for the inventory), and creates, during the installation, already a topology map based overview of your network via a parent-child relationship. Additionally, the app can do a complete upstream path cross checks for duplicated used wavelengths in an RFoG environment and collects images and documents during the on-site installation. Available as online information, such data are also quite beneficial for later maintenance and service tasks.
- DELTANET CONFIGAPP: The mobile device based app (available for Android and iOS) enables on-site configuration of Delta devices via WLAN access. WLAN access is granted by using the FOSTRA-C module during on-site installation. Thus the configuration of each node/amp of your network can be saved and stored centrally.

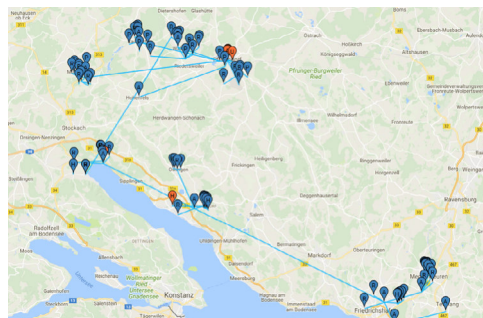
DELTANET FOSTRA-F

- Module-oriented remote control solution for HFC/RFoG nodes/amps
- User friendly GUI grants access to relevant parameters of your nodes/amps, such as ingress suppression for error analysis in collaboration with your umbrella management system
- Robust and reliable Linux based platform, available as standalone or centralized database solution
- Access via web GUI (http(s)), REST API,SNMP v2c implementation with its own generic MIB. It can be granted access to the database in project approach
- Based on FSK, unidirectional, consumes no additional bandwidth since the FSK carrier can be placed in-between two downstream carriers
- Pay as you grow licensing scheme



DELTANET SCANAPP

- Client/Server approach. Server e.g. installed at the headend or other location with a permanent connection to the internet
- Client app located on installer's mobile device (Android and iOS supported), offline data will be synchronized as soon app is online again
- Node/Amp registration by scanning QR codes available on each device (corresponding mapping file can be extended)
- 1 QR code per node/amp, 1 QR code per FOSTRA-F module if installed
- Integrated link test between HEC database and FOSTRA-F module
- Automatic inventory and asset control
- Topology or list view of installed components and given dependencies (signal path)
- Parent device function enables view for complete upstream link, from chosen device to headend



DELTANET CONFIGAPP

- App located on installer's mobile device (Android and iOS supported)
- FOSTRA-C module to be plugged into corresponding slot of amp / node
- FOSTRA-C module acts as a WLAN access point
- WLAN access to the device via FOSTRA-C
- Configuration can be stored/recalled on the mobile device, incl. import/export of the data



DELTANET FOSTRA-F

The core of DELTANET FOSTRA-F is a MySQL/MariaDB based database running on a Linux server platform. The database can be hosted on the Head End Controller (HEC) itself or on a (customer supplied) centralized server system (might be also a virtual machine). The database keeps the device related information of each node/amp, such as name, address and type. In addition, type dependent parameters, such as US related ingress control (main aspect), DS on/off, burst mode on/off, Eco mode or OMI settings are stored in the database.

In each installed device - which shall be controlled, an FSK receiver plug-in is put in - the FOSTRA-F module. The gateway between the database, respectively GUI for user interaction and the FSK receiver, is the HEC (Head End Controller). For initial setups or smaller networks, the HEC contains and operates the database as well as user interface for operational tasks. (recommended for networks up to 500 nodes/amps). For bigger networks or usage of multiple HECs in an overall network a centralized, -database server platform is recommended to be used for simplified administration and consolidated IT infrastructure. This allows a single point of configuration and control approach, although a local access to the dedicated HEC units and their assigned modules is still possible.



Node/Amplifier with FOSTRA-F module



Database on HEC or dedicated database server

Prerequisites - All you need is ...

- || A hardware platform to host the FOSTRA-F database. This can be the HEC (Head End Controller) for smaller networks, or a Linux based (customer supplied) server system
- || Our DELTANET software allows a pay as you grow approach, based on you network sizes, respectively number of used FOSTRA-F modules. Test or Standard licenses to handle initially up to 30 FOSTRA-F modules, upgradeable in steps of 500. For larger project based setups please contact your sales representative.
- || Corresponding number of FOSTRA-F modules to be installed in relevant nodes/amps
- || Optional: ScanApp for smart registration of nodes/amps during installation and therefore data insertion in map based network view and automatic inventory

Name	HEC ID	MAC ID	Address Line 1	Address Line 2	Type
00 LHD 43 Test Telecabale	0	00242F0A3C AE			Amplifier LHD or BND
00 NVD 0143 Test Telecabale	0	00242F0A3C AE			Amplifier NVD
Foetra-kunabile-LHD-1	0	00242F0A39 C4	Adress Street 9	3953 LHD City	Amplifier LHD or BND
Foetra-kunabile-LHD-1	0	00242F0A39 C3			Amplifier LHD or BND
Foetra-kunabile-NVD-1	0	00242F0A39 C2			Amplifier NVD
Foetra-kunabile-ONH-1	0	00242F0A40 95			Optical Node 12CH/12CH/12CH
Foetra-kunabile-ONC-1	0	00242F0A39 C5			Optical Node 12CH/12CH/12CH
Foetra-kunabile-ONH-1	0	00242F0A40 9A			Optical Node 12CH/12CH/12CH
LHD3	0	00242F0A40 B3			Amplifier LHD or BND
omiscoti	0	00242F0A39 98			OM-MSD

Edit data

Name: ONHG 12CH test

HEC: 1

MAC Address: 00242F0A38 B7

Address 1: address

Address 2: address

Comment: comment

Type: OFF-D

DS: Yes, No

ICS: Yes, No

CW: Yes, No

DS ATT: 30dB

US ATT: 60dB

Ingress Filter: Yes, No

Slope 3dB: Yes, No

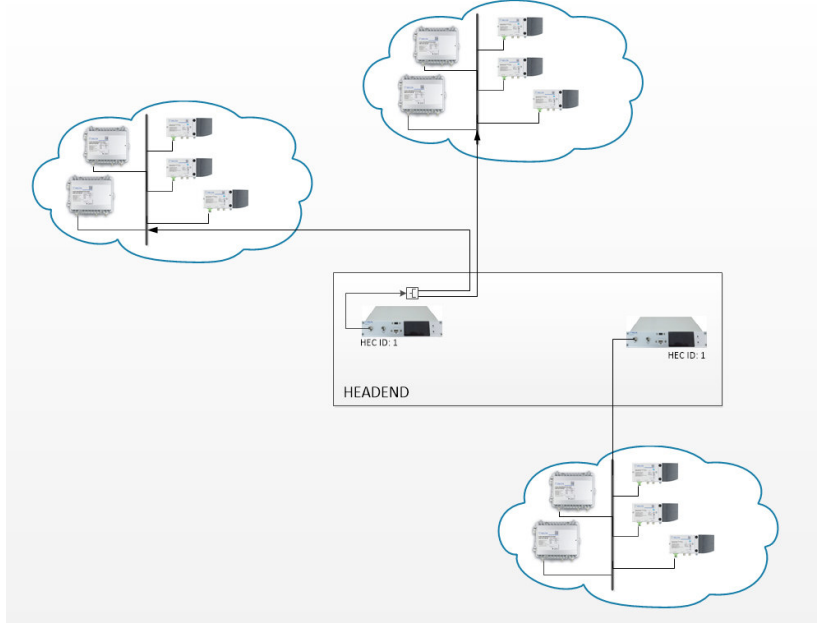
Please be aware switching from 'Standard' to 'Extended' Command Set cannot be reverted

DELTANET FOSTRA-F DESIGN RECOMMENDATION

Standalone approach

Recommended for

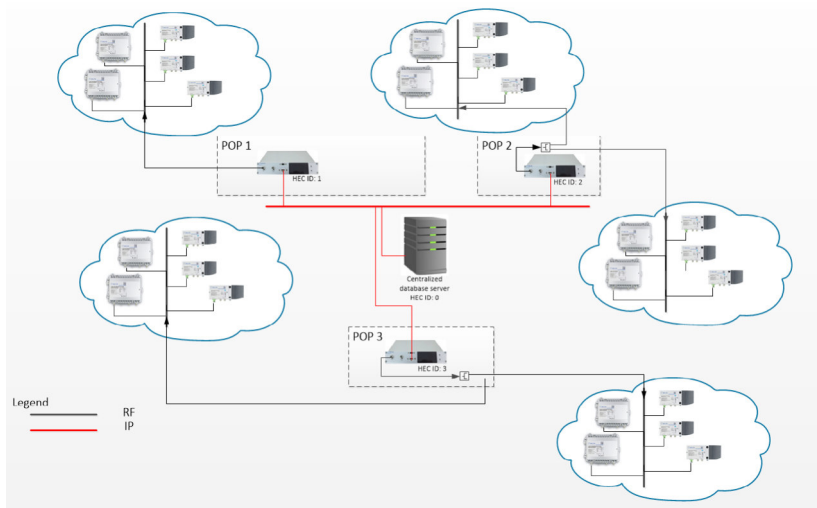
- || Smaller sized networks: HEC in standalone mode
- || Database runs on HEC and HEC acts as RF single controller to attached Fostra-F modules



Centralized Server approach

Recommended for

- || Medium/big sized networks: Centralized server for multiple HECs which hosts the database.
- || HEC acts as RF gateway only



HEC2191 - HEAD END CONTROLLER (HEC) FOR DELTANET FOSTRA-F



Cost-effective remote control system for HFC/RFoG nodes/amps

- || HEC in operation with DELTANET FOSTRA-F modules. Protocol implementation based on EN 60728-14
- || Compact FSK-transmitter as desktop unit, mounting kit for 1RU 19" installation included
- || Variable Transmit Frequency Ranges. General range is from 860.5..879.5 MHz with preselected main center frequencies at 862 MHz, 868.3 MHz and 870 MHz. (preselected 300kHz sections as standard)
- || Web based GUI, running locally or centralized, Linux operated
- || 1 RF output (selectable on front or rear panel) with RF test point (-20dB)
- || Electronic level adjustment of output signal
- || 100 Base-T RJ-45 connection, USB-port for serial connection
- || Standard HEC includes basic test license for 30 FOSTRA-F modules (subscribers), expandable in steps off 500 additional FOSTRA-F modules
- || HEC can host the database. Alternatively the database can be installed on an external server. In this case the (multiple) HECs will act as RF gateways only. Recommended for more than 500 subscribers



FOSTRA-F Microreceiver for Fibre Nodes and Amplifiers

- || Remote control functions: DS ON/OFF, Burst Mode ON/OFF, Ingress Detection Switch 0/6/45 dB, Eco Mode on/off, OMI adjustment *
- || Easy integration into smartphone application DELTANET ScanApp
- || FSK-based, robust, no return path necessary
- || FSK signal can be configured between two SC-QAM carrier – no additional bandwidth consumption or other frequency block allocation.



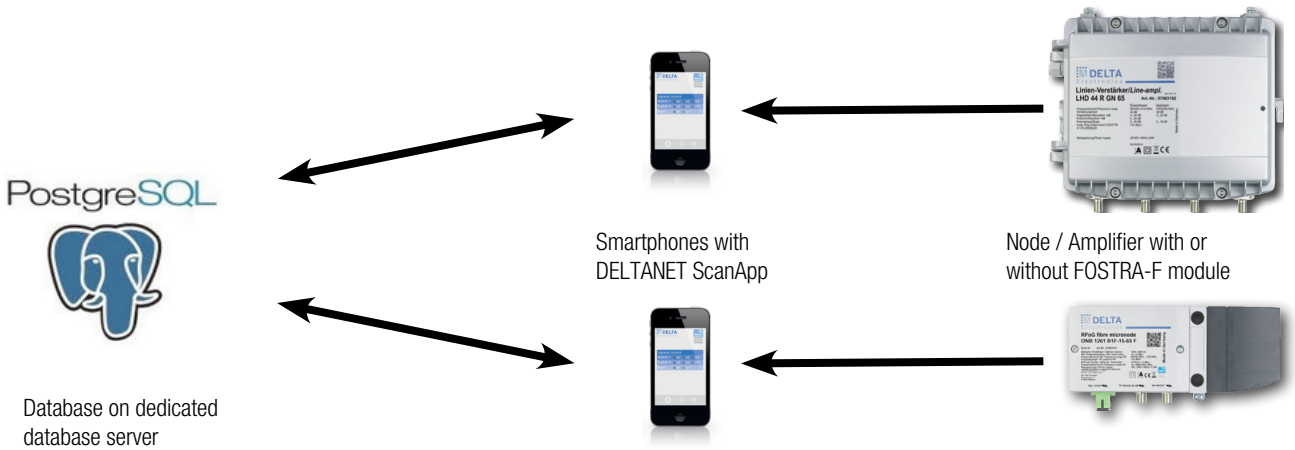
* whole functionality depending on amp/node type

Type	HEC 2191	FOSTRA-F
Application	DELTANET / FOSTRA-F	ONH, ONB, BKD, LHD, NVD types
Item No.	Item number see page 9 bottom	Item number see page 9 bottom
TX-frequency	MHz 860.5-879.5 MHz (other frequencies on request)	862 / 868.3 / 870 MHz, each with a ± 300 kHz capture range (other frequencies on request)
Monitoring-Status LED	green (=Tx ON)	green: 0 / 6 / 45dB, DS ON/OFF, Burst Mode ON/OFF
Bandwidth	kHz 120	120
Spurious	dB μ V < 10	< 10
Distortion	dB > 66	-
Dynamic-Input level	dB μ V -	30..75
Transmitting level	dB μ V 1 x 69 ... 100 (set by software)	-
RF test point	1 x -20 dB	-
Data Speed	Bps 4800	4800
Local Interface	100 Base-T RJ-45 and USB (as serial port)	RS-232 (only for debugging)
Power supply	V~/W 200 - 240 AC / 5 DCV (1A) / < 5	6-24V / < 0.4W@24V / < 0.18W@12V
Dimensions	mm 220 x 140 x 1RU (chassis only) 19" x 140 x 1RU (with mounting frame)	25 x 24 x 8
Weight	kg < 1.0	0.02
IP protection class	IP 20, Indoor	

DELTANET SCANAPP

Registration of new nodes/amps can be done already on site during installation via DELTANET ScanApp, available for Android and iOS. Simply scan QR codes of the node/amp and (optional) corresponding FOISTRA-F module and transfer device related data, together with geo positioning data and other related data, to the ScanApp database via the internet.

- The ScanApp (hosted on a smart phone or tablet) enables an automated collection of your management relevant data of the installed device, incl. location data, installation time, installer's ID and picture(s)
- Systematic collection of location data and documentation of most important parameters of your network devices during installation plus automated cross-checks (duplicate used wavelength or port usage) helps the service teams to avoid errors during installation phases. Automatic transfer into a centralized database allows the operator to look for current status of network deployment incl. current topology overview. In addition the link between FOISTRA-F module (if installed) and corresponding HEC can be verified.
- ScanApp runs on Android and iOS



The screenshot shows the web interface of the DELTANET ScanApp. It includes a map of the Bodensee region with a red line indicating a network route. A table lists device details such as Name, QR Name, MAC, Production date, Installation date, Serial, QR-Code, Address, Description, Asset number, Installer, Type, and Status. A QR code is shown for mobile phone registration, along with a list of registered user phones.

Actions	Name	QR Name	MAC	Production date	Installation date	Serial	QR-Code	Address	Description	Asset number	Installer	Type	Status
[Edit] [Delete]	RF-LHD43-Test-01	LHD 43 GA	0	2017-04-14 20:55	2017-04-14 21:02		1_2_37002010	Address	1.2GHz, 4350, mod. Diplexer, 185-285 V-			HFC	Error
[Edit] [Delete]	RF-LHD43-Test-02	LHD 43 GA	0	2017-04-14 21:02	2017-04-14 21:03		1_2_37002010	Desander	1.2GHz, 4350, mod. Diplexer, 185-285 V-			HFC	Error
[Edit] [Delete]	RF-LHD43-Test-03	LHD 43 GA	367754259	2007-08-21	2017-04-14 21:03	3487_2008_37002010	3487_2008_37002010	Desander/ Teststrasse	1.2GHz, 4350, mod. Diplexer, 185-285 V-	123456	heppel	HFC	Error
[Edit] [Delete]	RF-LHD43-Test-04	LHD 43 GA	0	2017-03-06	2017-04-14 21:04	1911_8582_37002010	1911_8582_37002010	Address	1.2GHz, 4350, mod. Diplexer, 185-285 V-			HFC	Error

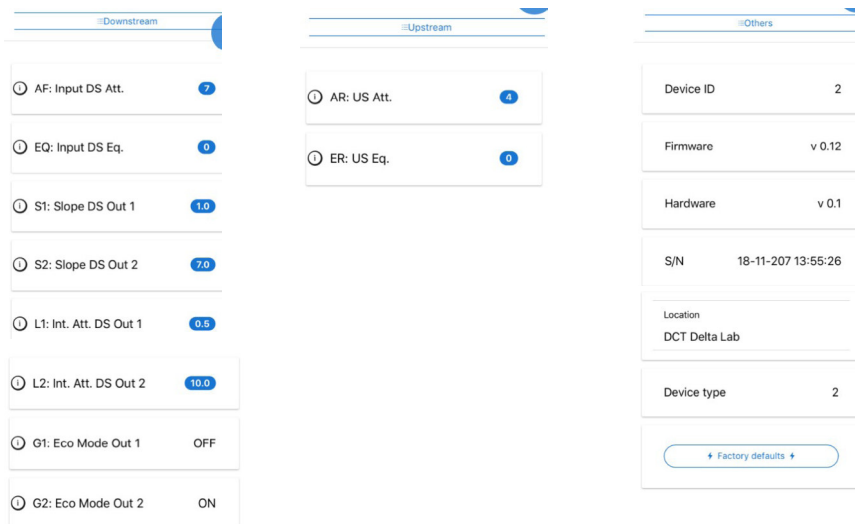
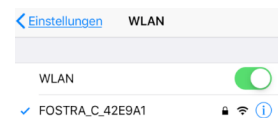
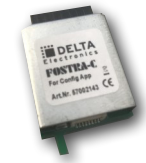
DELTANET CONFIGAPP

DELTANET CONFIGAPP is an application which enables a technician to configure certain DCT DELTA devices by using a mobile device with WLAN capability. Beside the app on the smartphone one requires a FOISTRA-C (C for Configuration) module. This module needs to be plugged in the socket, where in general the FOISTRA-F module is placed. The FOISTRA-C module acts as a wireless access point.

The CONFIGAPP is available as an iOS or Android version for mobile devices or as an Windows (10) version for laptops.

Accessible data:

- || Access to all main settings, which can be performed via the push button menu, such as
 - downstream and upstream relevant parameters
 - device specific settings, e.g. eco mode on/off
- || The app displays information about hardware / firmware / serial number of connected device
- || Location/address can be assigned
- || Logfile - shows activities
- || Import/export of the configuration files enables centralized storage of the data and transfer to other mobile devices.



DELTANET PRODUCT OVERVIEW

Type	Item No.	Description
HEC 2191	57003259	Head End Controller incl. basic 32 user license
DELTANET license extension +500	57005352	Upgrade license, to manage additional 500 FOISTRA-F modules
FOSTRA F V2 868.3 VER	57004089	FSK module 868.3 MHz
FOSTRA F V2 862 VER	57004088	FSK module 862 MHz
FOSTRA F V2 Tuneable VER	57003909	For a vertical mount 861.7 – 862.3 MHz / 868.0 – 868.6 MHz / 869.7 – 870.3 MHz
FOSTRA F V2 Tuneable HOR	57003908	For a horizontal mount 861.7 – 862.3 MHz / 868.3 – 868.6 MHz / 869.7 – 870.3 MHz
FOSTRA C *1 VER	57002143	WiFi Config Module for Fostra-F Connect.
DELTA SCANAPP BASIS	57003559	ScanApp Server Software incl. license for 500 subscribers
DELTA SCANAPP +500 LIC	57003560	ScanApp license for additional 500 devices
DELTA SCANAPP +1000 LIC	57003590	ScanApp license for additional 1000 devices
DELTA SCANAPP +5000 LIC	57003591	ScanApp license for additional 5000 devices
DELTA SCANAPP ANDROID	57003561	ScanApp Mobile App for Android
DELTA SCANAPP IOS	57003562	ScanApp Mobile App for IOS

*1 FOISTRA C is a service interface for temporary installation and configuration settings and must be removed from the amplifier or optical node for error-free and standard-compliant operation before it is closed.