

# General Description

## DataPowerBoost



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General Description

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# 1 Preface

## 1.1 Highlight

This document describes the functions of DataPowerBoost, the remote power feeding system for outdoor hotspot, wi-fi AP installation, its operational method and configuration.

## 1.2 Structure

The following chapters can be found in this description:

1. Preface

Basic information about the document contents.

2. General

System overview and system elements.

3. Technical features

Data interface, remote power, etc.

4. Device reference

Electrical parameters, user interfaces, environmental conditions, etc.

5. DataPowerBoost configuration

RPF monitoring.

6. Safety requirements

Remote power information.

### 1.3 Revisions

Release	Date	Comments
v1.0	12-10-2011	Basic description of W-Feeder

## 2 General

## 2.1 System overview

The DataPowerBoost is a flexible system to provide power feeding and data link up to the remotely installed equipment. At the unit there is a remote power card which terminates the power line(s) and the xDSL link and can connect several third party instruments like modems, wi-fi modules or any telemetric devices. The system is available with up to 4 power links and with ADSL or VDSL capability as well.

Both version of the feeder system is fully transparent for the data – a special filter is used only to manage the frequency shaping on the copper line. Both versions are compatible with Annex A, B and M standards, factory option upon customer's request.

The maximum available bandwidth depends on the length of the link. Taking into consideration that it is an urban application with relatively short distances (< 2 km) it is possible to reach the higher ranges of ADSL2+ or VDSL technologies.

Basic configuration:

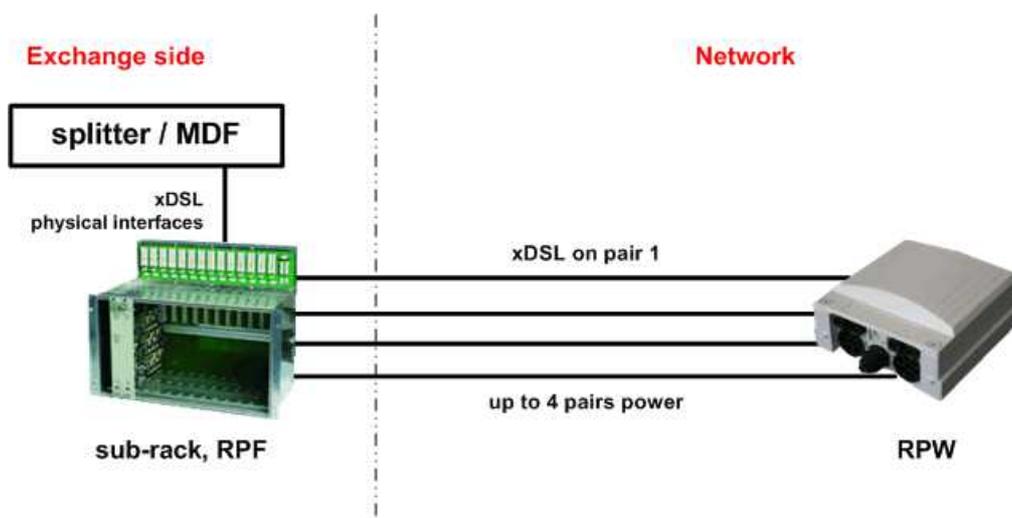


Figure 1. – Basic configuration

The system contains 2 main units:

- **RPF** – Remote Power Feeding unit, located at the Exchange which can provide the power on 4 copper pairs (see document *GenDesc RPF v1.0*),
- **DataPowerBoost** – remote termination, located somewhere close to the remotely installed devices, cabinets.

The DataPowerBoost is housed in heavy protected outdoor.

### Configuration options

As DataPowerBoost is very flexible for different type of installations, many configurations are possible. The basic card can connect several devices housed in the same box or in different box. The most required ones are the followings.



The RPW (power card of DataPowerBoost) can connect a modem and a data collector/distributor device. These units can be housed in the same box or can be installed in close boxes like DPs or cabinets.

This application is mainly used for higher capacity outdoor hotspots or data offload base stations. In this case some modem must be integrated next to the RPW card in the same box.

## 2.2 System components and accessories

One DataPowerBoost can terminate maximum 4 twisted copper pairs coming from the Exchange. It has different interfaces to connect further systems: 12 Vdc, 48 Vdc power or xDSL link or optional PoE interface. At the Exchange it is necessary to install the SBR sub-rack which provides the accommodation and cable connections for the RPF remote power unit.

### 2.2.1 Exchange

RPF	Remote Power Unit with 4 independent power interface towards the remote locations ( <i>see document GenDesc RPF v1.0</i> )
SBR-14	Standard 19" sub-rack for up to 14 RPF with IDC connectors ( <i>see document GenDesc SBR v1.0</i> )
NEM	Network Element Manager card for local/remote supervision ( <i>see document GenDesc NEM v1.0</i> )

### 2.2.2 Remote

DataPowerBoost	Remote termination device for powering third party remotely installed systems
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The DataPowerBoost is remotely powered equipment housed in outdoor box. It has the following functions:

- connects up to 4 copper pairs coming from the exchange (the first line is used for data also),
- provides several interconnection interfaces for third party elements.

The DataPowerBoost module can be fixed on mounting rails, to the wall or to the pole with the build-around outdoor box. Street cabinet installation is also possible with different boxes or rails.

It has a cable tail which should be connected to the suitable distribution boxes.

## 2.3 Network Management System

The Network Management System has 2 accesses to the devices: direct and remote.

The plug-in *Network Element Manager (NEM)* card is able to provide direct and remote supervision possibilities based on IP protocol. Both accesses require a client software installed on the PC or notebook called *Manager Monitor program*. It makes the real time monitoring, shows the power parameters of the connected systems, collects event logs and creates the visual view all of the measured parameters.

# 3 Technical features

### 3.1 Data interface

The data interface of the DataPowerBoost provides transparent transmission for xDSL service between the Exchange and the subscriber side. Optionally ADSL and VDSL are possible.

The xDSL interfaces are implemented with simple filters based on frequency spectrum separation. In case of ADSL connection the standards of ITU-T are supported: G.992.1, G.992.3 and G.992.5 that are ADSL, ADSL2 and ADSL2+ both in Annex A and Annex B versions. During VDSL installation the filter is different and fulfills the ITU-T G.993.1 and G.993.2 standards.

## 3.2 Remote power

The DataPowerBoost is powered over additional copper pair(s) using high voltage remote power feeding scheme from the connected RPF. The power connection can be realized over one, two, three or four copper pairs according to the power requirement at remote end and the national line voltage level regulations. All remote power feeding sources and sinks meet the safety requirements of EN 60950-1 and EN 60950-21 with the following specification:

circuit category:	RFT-V (optional RFT-C)
remote feeding voltage:	max $\pm$ 160 Vdc, software selectable
output capacity:	$\leq$ 20 $\mu$ F line to line
current limiting:	57 $\pm$ 1 mA
unbalance shut-down:	1.5 mA to Earth

Inversion of the voltage polarity of the power lines has no any impact on the operation of the system.

### 3.3 Alarm

Using the monitor program the user is able to observe remote power related alarms:

- open circuit,
- overload,
- asymmetry,
- over-voltage,
- over-current.

All kind of alarms can be notified in NMS GUI, described in document *GenDesc RPF v1.0 par 5.2*.

## 4 Device Reference

The DataPowerBoost is an active device that is used to provide remote power and data links to the outdoor installations, cabinets, distribution points. The typical applications include powering third party active devices installed outdoor where the local power doesn't exist. Furthermore, DataPowerBoost is suitable to accommodate smaller units in its own box like modems or wi-fi modules offering a very compact solution as an outdoor wi-fi AP or telemetry connection.

It is in fully sealed house and installed on the pole or at the street cabinet. The power and the xDSL signal is then terminated and served to the connected unit(s).

The DataPowerBoost is line powered on the same pair where the data comes. At the Exchange the DSLAM line should be connected to the RPF card where the digital signal is split together with the remote power feeding.

In case of higher power requirement it is possible to connect more (up to 4) power pairs to the outdoor equipment. The data is transmitted on the first power pair.

If one power pair is enough for DataPowerBoost, the Exchange installed RPF can connect 4 outdoor units with power and data: the RPF card is ready to combine the xDSL signal to both its power link.



*Figure 2. – DataPowerBoost*

## 4.1 Power consumption

The DataPowerBoost module is remote power fed through the 1 .. 4 power pairs with the following parameters:

input voltage:	up to $\pm 160$ Vdc
max. power consumption:	3 W
max. power dissipation:	2 W

This consumption is covered by RPF consumption.

The remote power fed equipment consumes less than 57 mA current in normal operating modes.

Taking 0.4 mm cable and the following distances/cable resistance the achievable output powers are as follows. 1p and 4p indicates the number of power lines coming from the RPF card at the Exchange.

distance (km)	electric length ( $\Omega$ )	P out – (1p) (W)	P out – (4p) (W)
0.5	140	15.5	62.0
1.0	280	15.1	60.4
1.5	420	14.6	58.4
2.0	560	14.2	56.8
2.5	700	13.8	55.2
3.0	840	13.4	53.6
3.5	980	13.0	52.0
4.0	1120	12.6	50.4

*Table 1. – Distance – power relations*

## 4.2 Mechanical parameters

The mechanical properties of the unit are the followings:

Dimensions (H x W x D): 210 x 191 x 108 mm

Weight: 1600 g

Installation: wall/pole/pit installation

### 4.3 Environmental conditions

The DataPowerBoost modules were designed and tested to meet the following environmental requirements of ETSI standards:

Operation:	ETSI ETS 300 019-1-3 class 3.3 ETSI ETS 300 019-1-4 class 4.1
Storage:	ETSI ETS 300 019-1-1 class 1.2
Transport:	ETSI ETS 300 019-1-2 class 2.2
Operational temperature:	-30 .. +70 °C
Relative humidity:	0 .. 100 %
Protection:	IP64

## 5 DataPowerBoost configuration

Using the Management Monitor program the remote power architecture can be monitored. The program collects and shows the following data:

- inventory data of power card (RPF),
- output voltage per line,
- output current per line,
- alarm issues.

It also offers setting possibility for the maximum allowed voltage and current level.

The NMS information, manual, installation, GUI can be found in documents *GenDesc NMS v1.0* and *GenDesc RPF v1.0*

The data transmission of the system and its parameters (modem/wi-fi inventories, DSL profile, traffic, attenuation, latency, SNR, etc) can be checked in the regular DSLAM management system. In case of demand it is possible to implement NMS feature at DataPowerBoost.

## 6 Safety requirements

- a) The remote feeding system of DAR has been classified as a RFT-C circuit according to the EN 60950-1 and 60950-21. The RPF provides up to 330 Vdc nominal voltage line to line ( $\pm 165$  Vdc nominal voltage line to earth).
- b) Effective capacitances of interfaces
  - between the connection points for the conductors of the Telecommunication Network is less than 1.5  $\mu\text{F}$
  - between the connection point for one conductor of the Telecommunication Network and Earth is less than 1.0  $\mu\text{F}$
- c) At the time of installation it shall be checked that the voltage rating of the wiring of the Telecommunication Network is adequate for the normal RFT circuit voltage together with the transients. The installed GDAs also must be considered.