

1. Teko Telecom Coverage and Capacity Systems General Description

Teko Telecom Coverage and Capacity Systems are flexible multi-band multi-operator Systems that provide a wide range of solutions to extend both indoor and outdoor cellular coverage in shadow areas -where the RF signal is not available- and to increase capacity in indoor and outdoor hot spots -where the operators need a dedicated coverage.

Modular design is a key feature of Teko Telecom Coverage and Capacity Systems: it offers flexible configuration options to build the most suitable solution for any coverage need.

The Coverage and Capacity Systems include a wide range of active and passive components that can be assembled in a variety of ways in order to provide easy to set-up, maintain, and upgrade products in the 380 to 2700MHz frequency range.

The Coverage and Capacity Systems components can be used in different Systems with different functionalities to meet present needs and to allow system adaptation to changing conditions, always assuring optimized performances.

This technical handbook describes the components of Teko Telecom Coverage and Capacity Systems and how these components can be assembled to provide Optical Systems and modular Off-air Repeaters to improve coverage in different environments.

- **Teko Telecom Digital Donor Front End**

The Digital Donor Front End Module is the single-band/single-operator System RF interface towards a Donor Antenna. No physical connections are required between the DFE and the cellular network: the Donor Antenna provides the connection to a BTS or NodeB over an air link.

Coverage Systems can be equipped with one or more Donor Front End modules to make multiple configurations available: single operator (single band / multi-band) and multi-operator (single-band / multi-band).



A single-band single-operator modular Off-air Repeater can be set-up combining a Digital Donor Front End Module and a Service Front End (Teko Telecom single-band/multi-operator interface towards a Service Antenna). Up to 4 Donor Front End Modules can be connected to a single Service Front End to provide a single-band 4-operator modular Off-air Repeater.

Digital Donor Front End Modules can also be used to drive Optical Systems: the Digital Donor Front End Module allows Optical Systems to be driven without the need of a dedicated BTS or Node B. A donor antenna picks-up the signal and the Optical System acts as a repeater with distributed Service antennas connected to the Remote Units. Service Front End subracks can be connected to DFE modules to provide coverage to the area next to the Master Unit site.

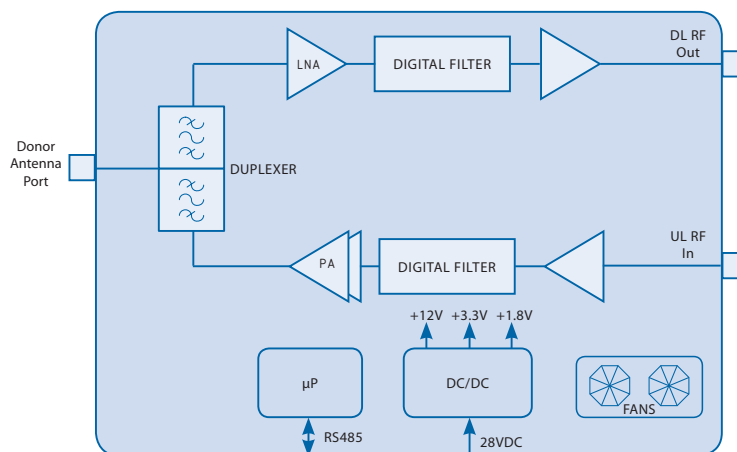
Each DFE module hosts the duplexer, to be connected to the Donor Antenna to separate/combine downlink and uplink paths.

In downlink the signal from the Donor Antenna is preamplified by a Low Noise Amplifier and converted into an IF signal by a downconverter. The selection of the band of frequencies or channels to be extended is handled by a digital filter.

The digital filter can manage 1 variable band or 2 variable sub-bands.

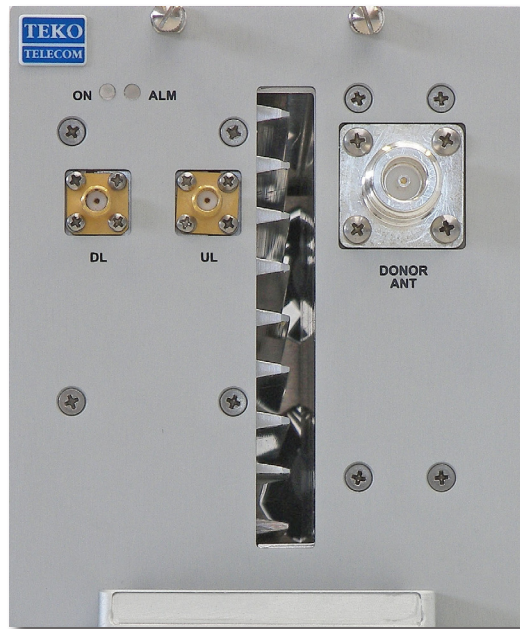
An upconverter converts the IF signal into the RF output signal.

In uplink the signal from the Service Front End Subrack or from the Optical System is converted into an IF signal by a downconverter, filtered and re-converted into an RF signal, amplified by a power amplifier and re-transmitted to the signal source.



Digital Donor Front End Module block diagram

Digital Donor Front End Module Access Points



RF Connectors	Description
DL	Downlink path RF output (SMA connector) to Service Front End or Fiber Optic Modules
UL	Uplink path RF input (SMA connector) from Service Front End or Fiber Optic Modules
DONOR ANT	Donor Antenna Port (N type connector)

LEDs	Description
ON	Digital Donor Front End Module operating status green LED ON when power supply is present
ALM	Digital Donor Front End Module alarm status LED: OFF: regular operation Blinking Orange: presence of active alarms with warning severity level (4) Orange: presence of active alarms with minor severity level (3) Blinking Red: presence of active alarms with major severity level (2) Red: presence of active alarms with critical severity level (1)

TECHNICAL DESCRIPTION

DIGITAL FRONT END MODULES

COMMERCIAL CODES (TDFE- Teko Telecom band code) For UL/DL Operating bands please refer to the Operating frequency bands Summary Table	TDFE-7SL; TDFE-7SH TDFE-8S; TDFE-8A; TDFE-9S TDFE-19; TDFE-AW
Down-Link	Output Power: 10 dBm Gain: 63 dBm
Up-Link	Output Power: 26 dBm Gain: 64 dBm
Number of variable sub-bands	Up to 2
Variable sub-band bandwidth	200kHz to 25MHz (100kHz step) - 1 sub-band 200kHz to 14.2MHz (100kHz step) - 2 sub-bands
Processed Band	up to 35MHz
Attenuation range on each sub-band (relative to set RF gain)	0 ÷ 30dB (0.5dB step) independent on each sub-band
Connector to the Donor Antenna	N (f)
Cooling	Active (with fans)
Power supply	28 ÷ 30 Vdc
Power Consumption	37 W
Operating temperature range	- 5°C up to +55°C (+23°F up to + 131 °F)
Weight	~ 3,5 Kg (7.7lb)
Dimensions	3HE / 21TE

OPERATING FREQUENCY BANDS SUMMARY TABLE

TEKO TELECOM CODE	UPLINK OPERATING FREQUENCY BAND	DOWNLINK OPERATING FREQUENCY BAND	Modulation
TDFE-7SL	698 ÷ 716MHz	728 ÷ 746 MHz	LTE (QAM, QPSK)
TDFE-7SH	776 ÷ 787MHz	746 ÷ 757 MHz	LTE (QAM, QPSK)
TDFE-8S	806 ÷ 824 MHz	851 ÷ 869 MHz	iDEN
TDFE-8A	824 ÷ 849 MHz	869 ÷ 894 MHz	GSM-EDGE-TDMA- CDMA-WCDMA-LTE (QAM, QPSK)
TDFE-9S	896 ÷ 902 MHz	935 ÷ 941 MHz	iDEN
TDFE-19	1850 ÷ 1915 MHz	1930 ÷ 1995 MHz	GSM-EDGE-TDMA- CDMA-WCDMA-LTE (QAM, QPSK)
TDFE-AW	1710 ÷ 1755 MHz	2110 ÷ 2155 MHz	CDMA-WCDMA-LTE (QAM, QPSK)