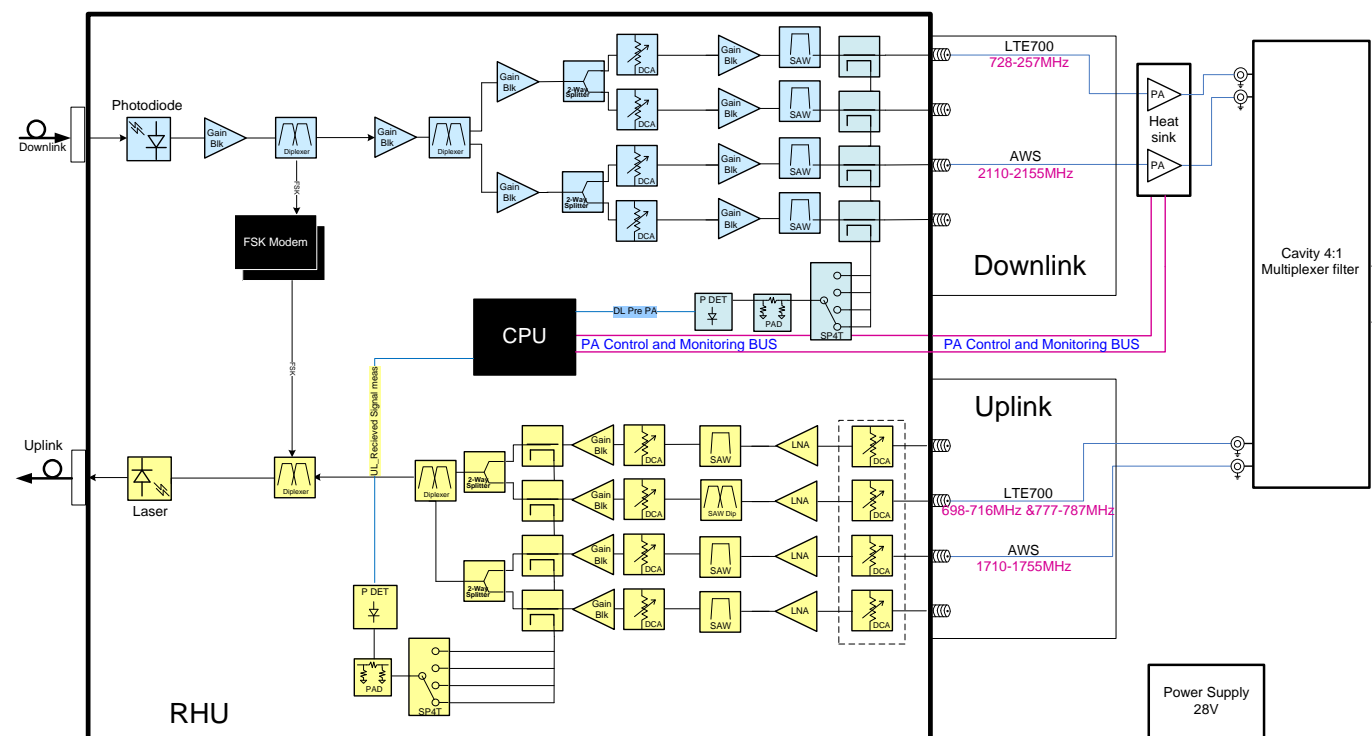
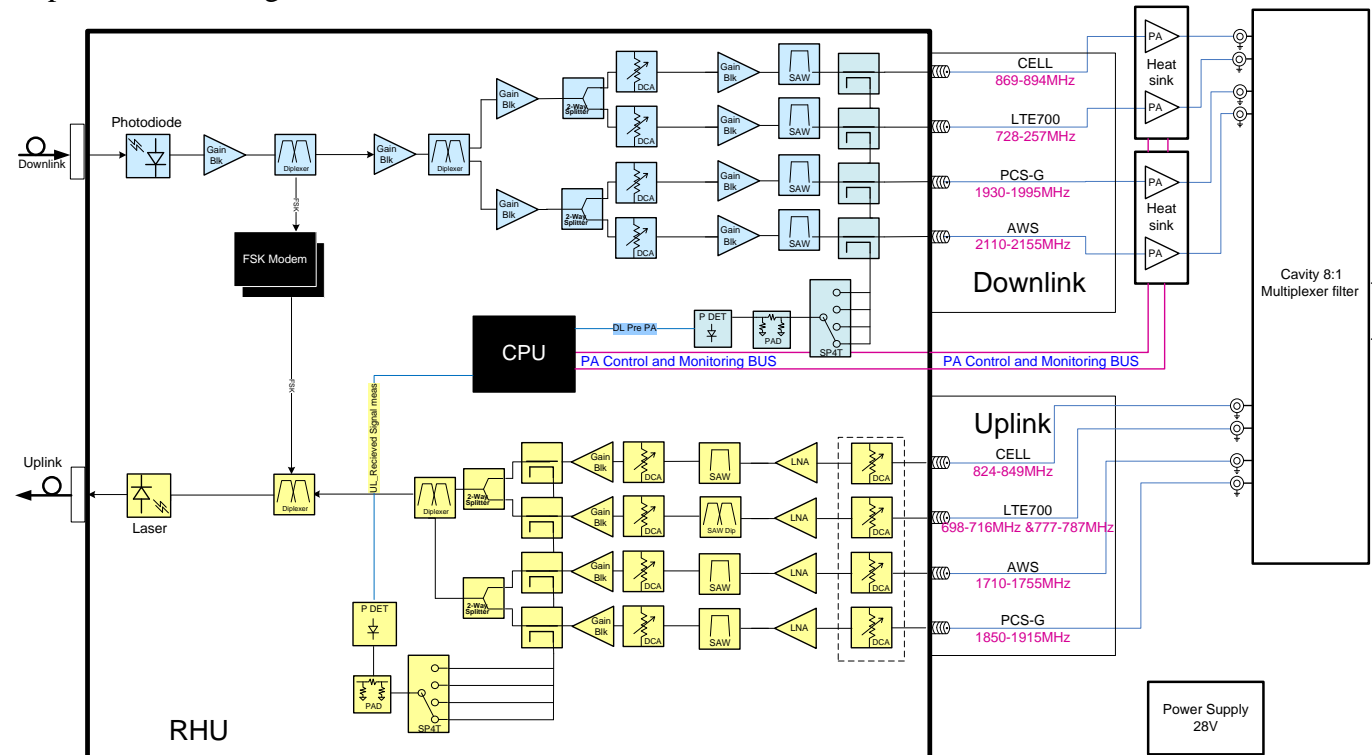


HX MIMO Operation Description and Power Protection Mechanisms

Simplified block Diagram



System Structure

The HX MIMO consists of two sets of HX in one enclosure. First set is 4 bands of SISO and additional set is 2 MIMO Bands. The MIMO set is a duplicate of SISO , just without the additional heat sink blade containing the PA modules for CELL and PCS-G bands.

- SISO set contains RHU, 4 Power Amplifiers (2 on each heat sink), 8:1 Cavity Multiplexer Filter and a Power supply.
- MIMO set contains RHU, 2 Power Amplifiers (2 on each heat sink AWS & LTE), 4:1 Cavity Multiplexer Filter and a Power supply.

SISO supports the bands:

Band name	UL Frequency bands	DL Frequency bands
LTE700	698-716MHz & 777-787MHz	728-757MHz
CELL	824-849MHz	869-894MHz
PCS-G	1850-1915MHz	1930-1995MHz
AWS	1710-1755MHz	2110-2155MHz

MIMO supports the bands:

Band name	UL Frequency bands	DL Frequency bands
LTE700	698-716MHz & 777-787MHz	728-757MHz
AWS	1710-1755MHz	2110-2155MHz

Operation Description

The DL path signal is received thru the fiber into the photo diode. From this point it is amplified. The FSK controlling and management signal is separated from the main path using a duplexer filter. From that point the signal is amplified, then splitted to High band and low band, amplified again and splitted into two bands. Using DCAs the power levels are balanced between the bands. As the bands are established, then they are amplified again and filtered to suppress for each band, any non-relevant band. Before injecting the band signal to the power amplifier, the signal is coupled and measured to sense the signal strength before the PA.

When the band is amplified by the last stage, PA, it reaches to the desired power level, maintaining the linearity required to comply with regulation limits and as well deliver the required signal quality for any kind of modulation. The PA output is monitored for limiting and protection purposes.

The Cavity Multiplexer then, combines all the power amplifiers outputs into the Antenna port. Additional system port is the coupling port that is used for monitoring the DL signal strength without the need of disconnecting the antenna port.

The UL path starts at the right side. Signal from Antenna passes thru cavity Mux path, per UL band, the first component is the Limiting controllable attenuator (DCA) then amplified

by LNA chain, filtered again, balanced for gain with the DCA and samples with a coupler (used for UL Limiter) before it's combined with other UL paths. Last duplexer before the Laser diode is combining FSK Tx into this path as well. From this point the signal goes in optics thru a fiber to the head end.

In addition to this, the unit consists of Power Supply section that feeds all the parts and digital control area that manages all indications and alarms, communications etc.

Over Power Protection Mechanism

Since there are 2 signal direction for each band, the system has two different protection per band as well.

1. UL Input signal protection.
2. DL Output signal protection

UL Input signal protection – UL Limiter

UL Path can face a strong input signal that comes from passing by mobile phone users. If this mobile phone, from some reason is located too close to antenna, there might be need of protection. This protection is implemented by Input limiter.

The UL detector is calibrated per band, during production phase to measure the UL input signal. This calibration is stored into the unit. When a signal appears at the antenna port, and this signal is stronger than the threshold of -40dBm, the input DCA is activated to protect the input stages of the UL path. When the strong interfering signal is reduced, or disappeared, the Limiter is released.

DL Output signal protection – DL Limiter

DL Path detectors are also calibrated for each band during the production phase, so system could read the output power levels. During the life of the system, the output power is measured and compared to the required output power. When, from some reason, the output signal trying to rise above the required output signal level, the gain is reduced by DCAs that are located in the RHU DL paths, in order to keep the output power that was defined at the commissioning stage.

When the strong signal is reduced back, the Limiter is released, and the output power returns to the required level.