# RFoF Multi-Simulator Radio Interconnect System

**3 Channel Simulator Node Radio Interface**

**3 Channel Central Node Radio Interface**

**RF Fabric – Non-blocking Multi-Channel RF Cross-Connection**

**RFOptic**'s Multi-Simulator Radio Interconnect System provides multi-channel private wideband RF connection between multiple radios and data links. This RFoF System is fully bidirectional and allows shielded and private equivalent of over the air connectivity of numerous radio channels. All radios are able to receive and transmit to all other radios through a fully isolated Optical interconnect without any emissions or susceptibility to external interference. This RFoF system is flexible and allows a customizable number of radio channels per site and number of sites. The frequency coverage of the system includes HF bands starting at 1MHz while the coverage is typically up to 3GHz, it can be extended to higher frequencies upon request. The system is configured in a star configuration where each Simulator node which houses its radios is located at one of the vertices of the star configuration which is connected to a central or control node at the center. The center node includes the counterpart of the bidirectional RFoF link for each simulator site as well as an RF Fabric interconnect which cross-connects all signal ports to all others. The RFoF links are fully configurable and programmable are remotely managed and controlled by RFOptic's M&C interface allowing optical and RF diagnostics as well as fault detection. This flexibility of configuration and the sub-system remote management and control functionality through HTML/REST/SNMP interface allow the system to handle very different application and requirements. External 30dB power attenuators are added to handle high power (typically 20W) radios.

## Key Features:

- Integrated and flexible multi-channel bidirectional RFoF cross-connect system.
- Full support for the 1MHz to 3.0GHz bandwidth.
- Excellent linearity and gain control.
- Programmable RF and Optical performance.
- Built-in end-to-end diagnostics reduces installation and maintenance time.
- Integrated RF and optical power sensors.
- Reduced gain variation over temperature.
- Remote management and control via HTML/REST/SNMP interface.

## Configuration:

- 19" 1U Indoor enclosures.
- Configurable number of channels per site.
- Configurable number of radio sites.
- Other frequency ranges are available.

Both enclosures include Tx with built-in LNA and Rx RFoF terminal units. Each of these includes variable attenuator which can be used to customize the Noise Figure, Input P1dB, and IP3 over wide range of values. For special applications requiring temperature stability operation, a unique optional temperature compensation algorithm supports ±0.5 dB over $100^0$C variation of the ambient temperature. The RFoF link has excellent gain flatness with 0.5dB gain adjustment and tracking between links.

## Applications:

- Flight Simulator Radios Cross-Communication.
- Group training radio infrastructure.





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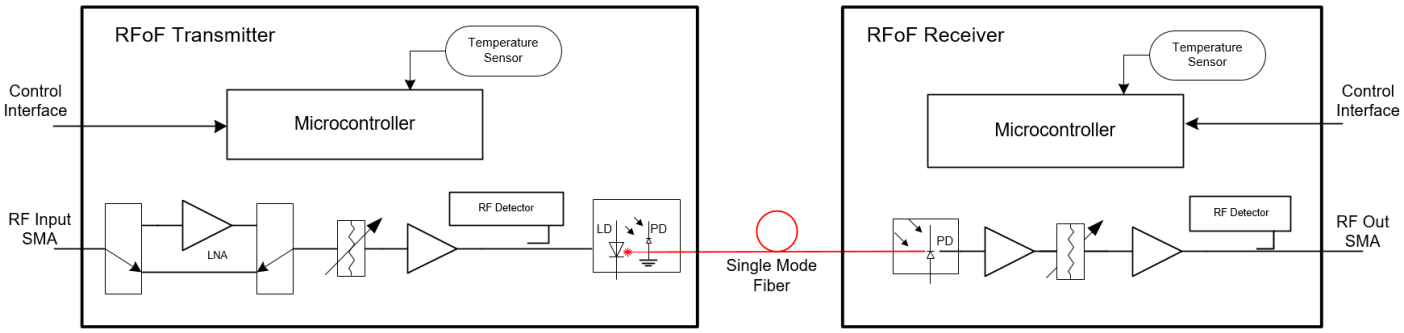
Each of the signals is transmitted over RFoF programmable links. A simplified block diagram of such a link is shown below.



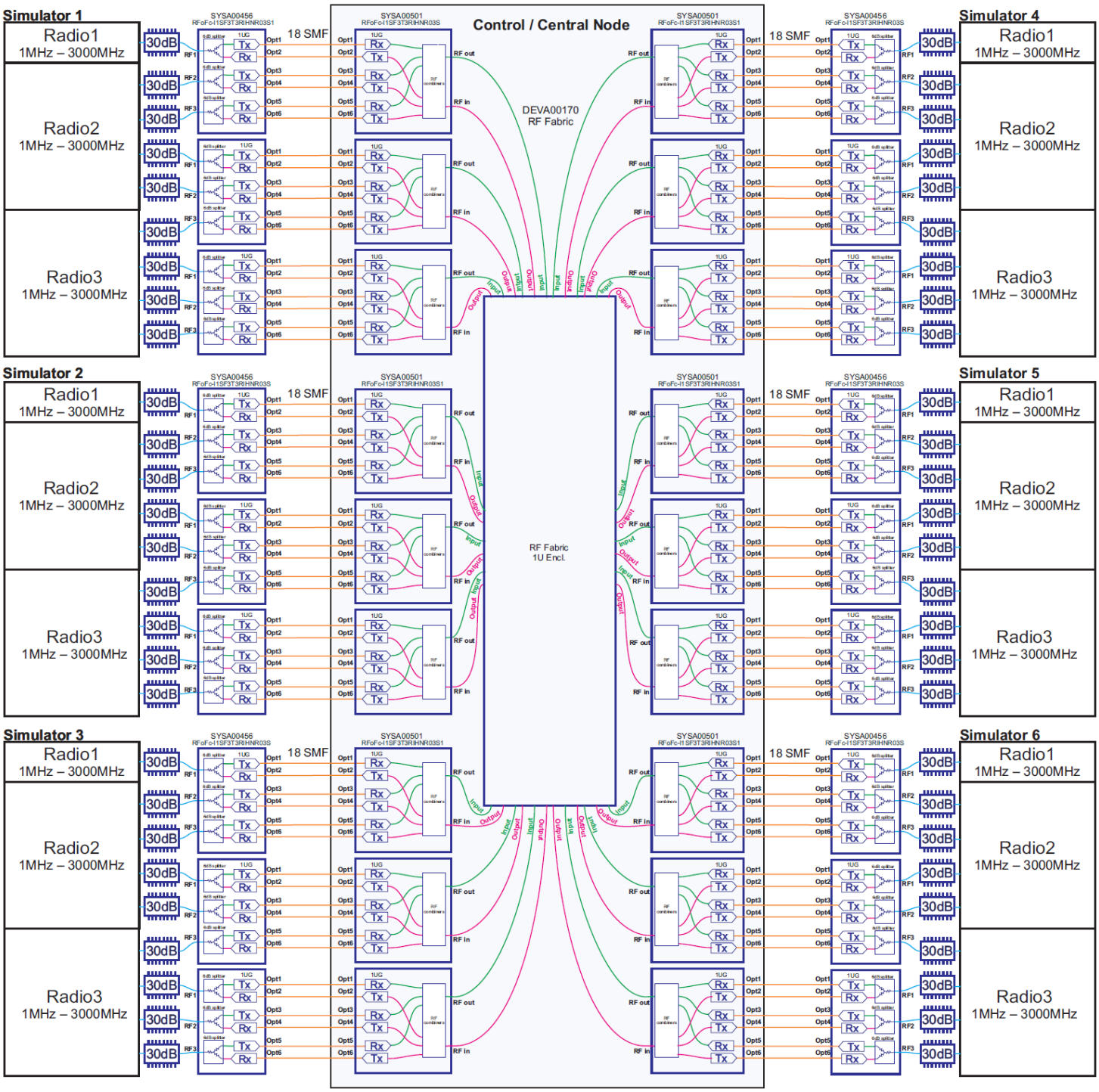

## Multi-Channel Programmable 3.0GHz RFoF System - Channel Specifications (Example)

| RF Performance [1] | Unit | Specification (typical) |
|---|---|---|
| Frequency Range | MHz | 1 - 3000 |
| Nominal Link Gain (adjustable) [2] | dB | -12 |
| Gain Flatness | dB | ±3 |
| Tx/Rx Attenuators 0 to 31dB, 0.5 step | dB | 0.5 |
| Input P1dBc [2] | dBm | 13 |
| Max Input Return Loss | dB | -15 |
| Max Output Return Loss | dB | -15 |
| Maximum Input No damage | dBm | 25 |
| Input / Output impedance | Ohm | 50 |
| **Optical and Electrical** | | |
| Laser diode wavelength | µm | 1.31 |
| System Monitor & Control | - | HTML/REST/SNMP |
| Optical Power in the fiber | mw | 3 |
| Power | - | 110/220 VAC |
| **Mechanical and Environmental Parameters** | | |
| 19” 1U Enclosure dimensions | mm | 445(W)* 476(L)*44(H) |
| RF Input/Output Connectors | - | SMA |
| Optical Connectors | - | FC/APC or SC/APC |
| Power Connectors | - | HP Socket |
| Data Connector | | RJ-45 |
| Operating temperature | °C | -20 to +70 |
| Storage temperature | °C | -40 to +85 |

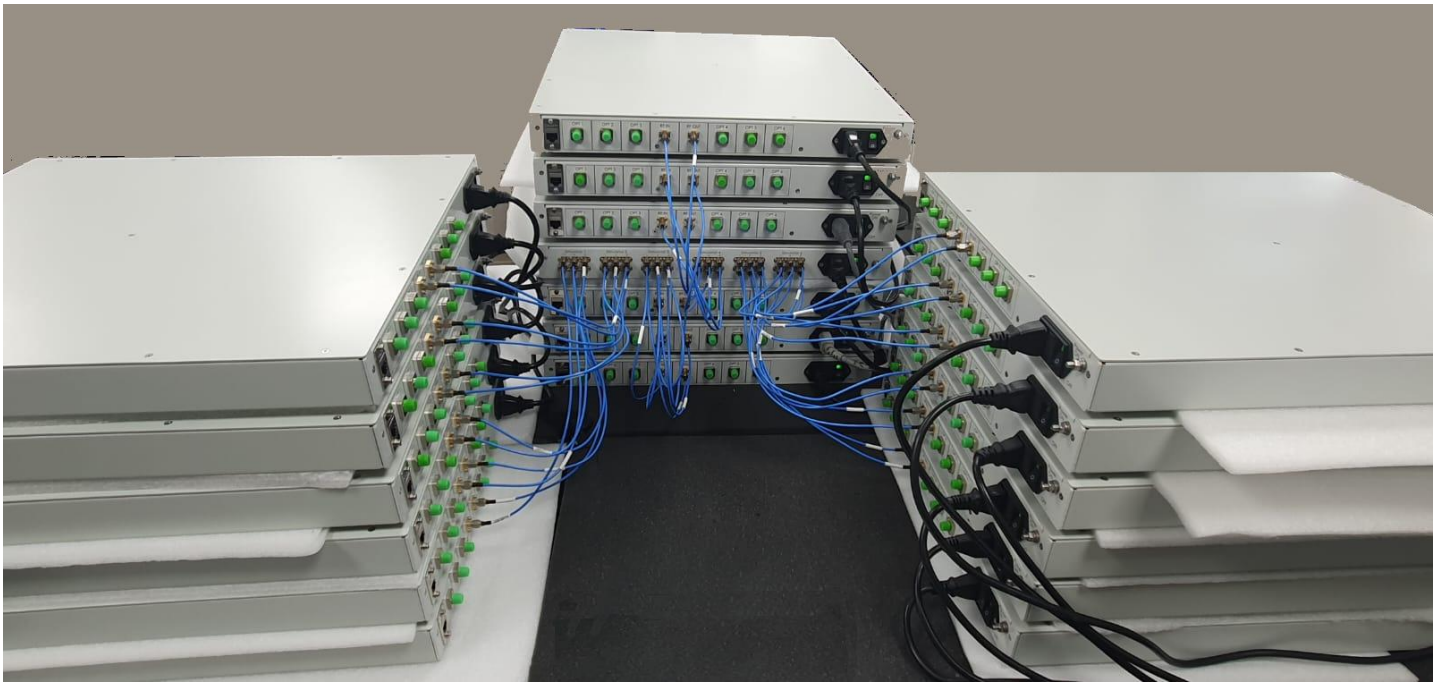
[1] Standard System Set-up: Control: LNA ON; Simulator: LNA Off, Tx attenuator 20dB.

[2] The link Gain and IP1dB can be adjusted by the Tx Attenuator using software interface.

# Sample RFoF Multi-Simulator Radio Interconnect System block diagram



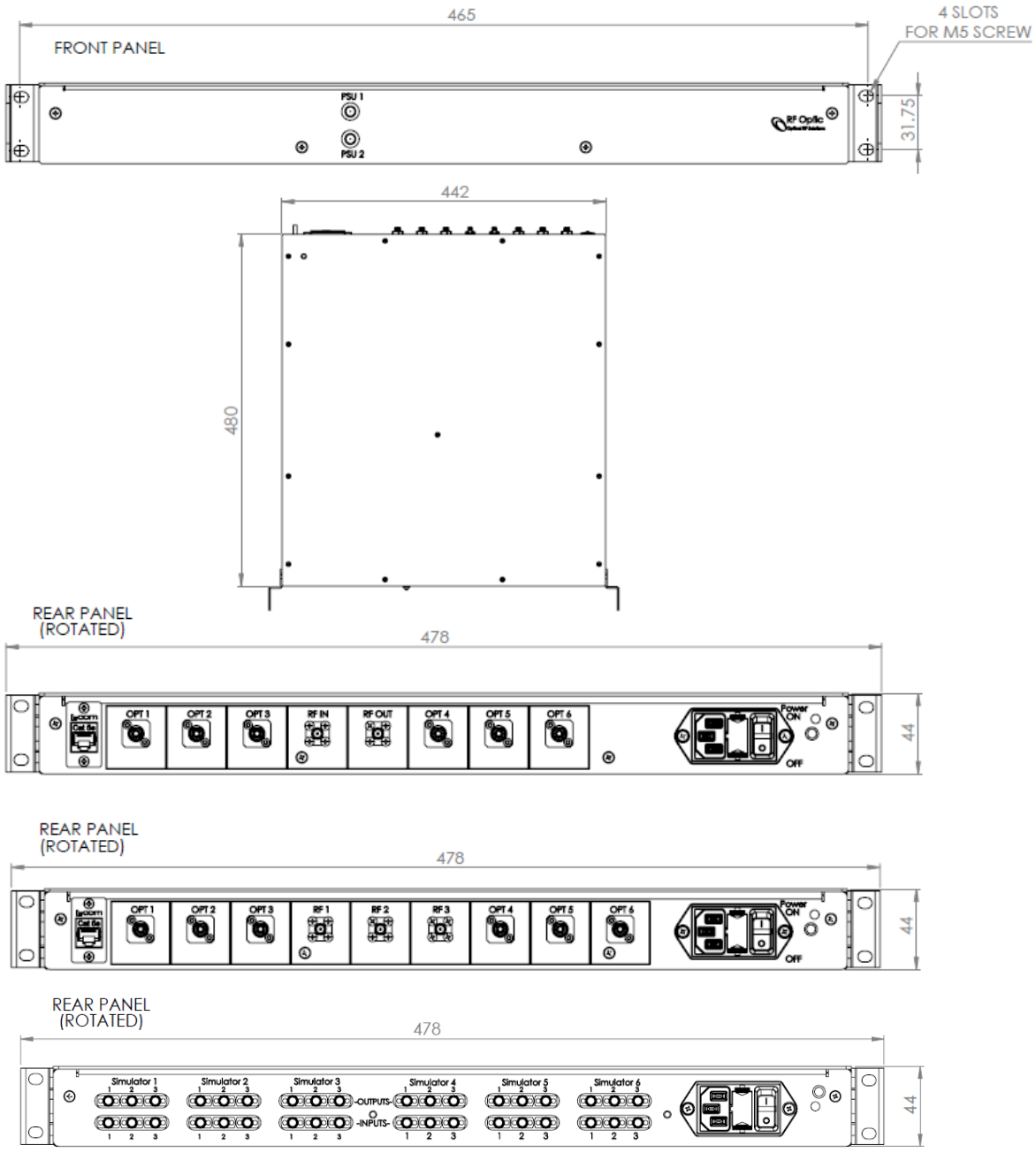
## Implementation images



**(i) Control/Center node RF connections**


**(ii) 9 Radios Simulator side setup, 1 of n**

## 19” 1U enclosure drawings




**For specific configuration, define the following:**

1. Enclosure type – 19” 1U Generic
2. Upper Frequency
3. Number of channels and frequency range for radio nodes
4. Number of Simulator radio nodes
5. Communication type - HTML
6. Power - 220VAC
7. Optical connectors – FC/APC or SC/APC