## RFOptic Monitor & Control Systems – Reducing Maintenance Time and OPEX

RFOptic's puts special emphasis on M&C systems both locally and remotely. RFOptic believes that for any optical system, it is crucial to provide detailed diagnostic information to the technicians who install the system as well as to the control room staff that monitors and controls the system.

RFOptic's Monitor & Control System has two levels: local M&C and remote M&C. Both enable the change of operating parameters and provide status details for the RFoF converter modules.

Short distance monitoring & control via a USB GUI
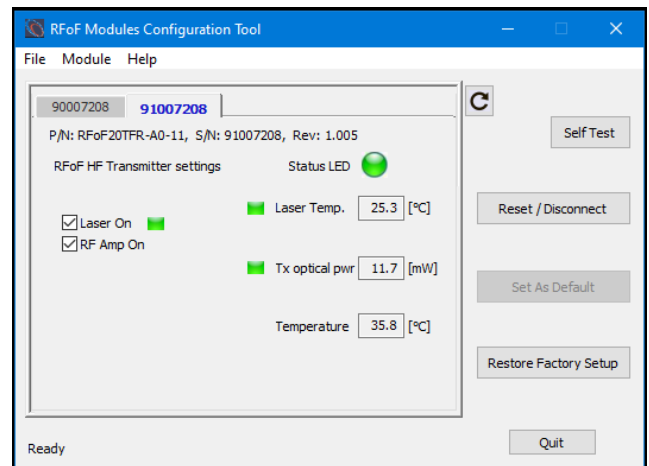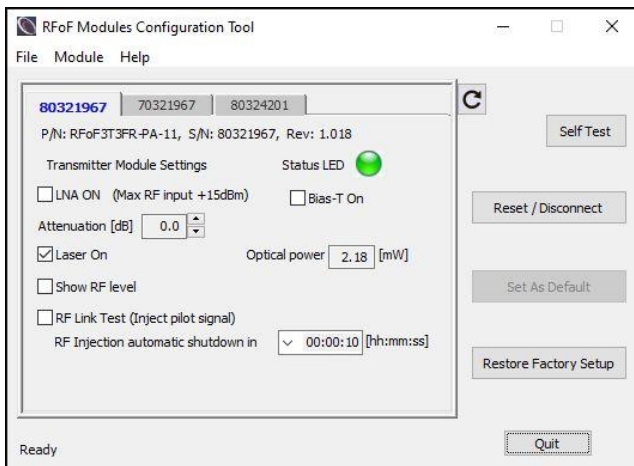
The RFoF converter modules provide the following information and control functions:

1. Serial number and part number.
2. Read the optical power of both Tx and Rx units.
3. Setup of default power-on state.
4. Read the module temperature.
5. State log file for diagnostic analysis.

The RFoF programmable series, up to 6GHz, additionally provides:

6. Turn the transmitter laser ON and OFF.
7. On/Off activation of a built in 30dB LNA.
8. Control the attenuation of the built-in step attenuators of both Tx and Rx units.
9. Diagnostic RF test of the Tx, Rx, and full RFoF link end to end.
10. Compensation option for gain changes over temperature variation.

The USB control also features an API with which it is possible to programmatically control the RFoF converters in OEM and embedded applications.
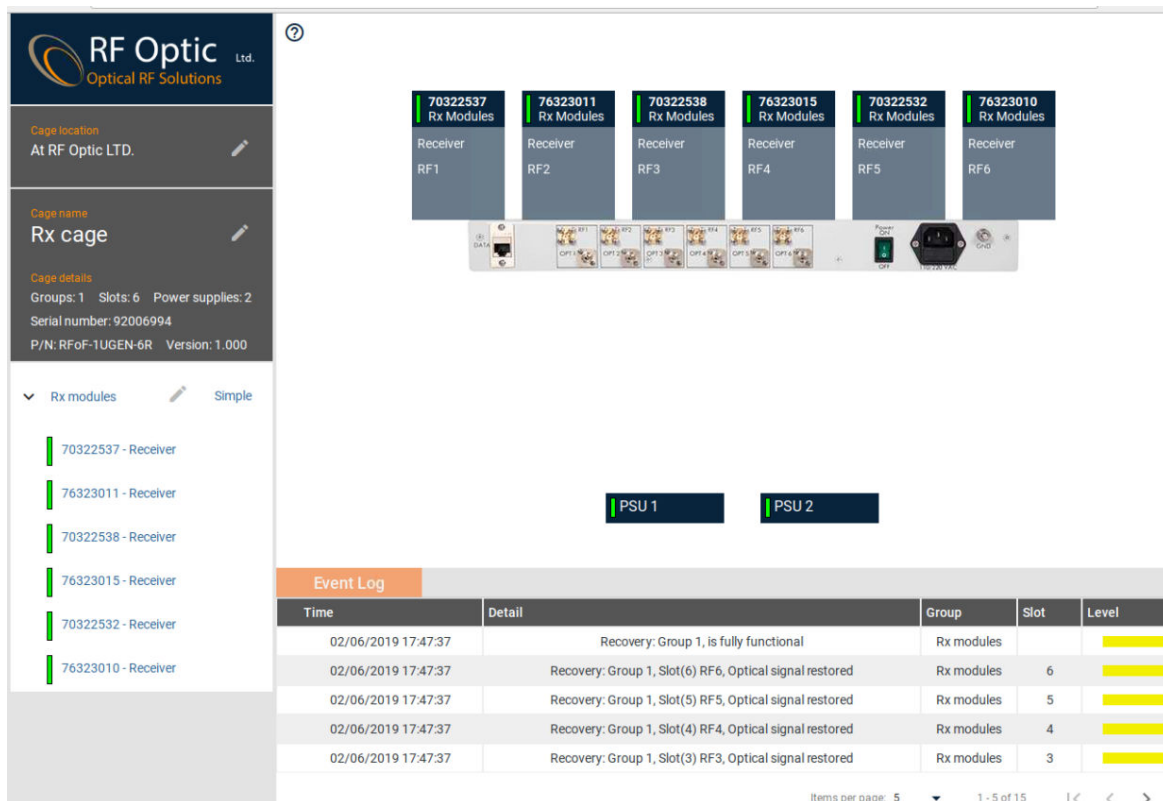
Additional capabilities are available in an Advanced Mode of the USB RFoF configuration tool.

Remote monitoring & control

RFOptic has developed a network management system for remote monitoring & control. The remote M&C is possible with SNMP V2c, HTML webserver and REST protocol. Under SNMP the customer's control room or NMS can be used to control the RFoF converters and get immediate notification of any change in the status of the system. SNMP is particularly useful for large scale deployment. For smaller deployments both indoor and outdoor cages provide a HTML/REST webserver-based remote M&C. The system displays a graphical configuration webpage that is accessible over LAN from any standard web browser and on any Ethernet capable device. The system operates optimally with Google's Chrome web browser.

Following are the functions and capabilities of the RFOptic SNMP/HTML/REST M&C system:

1. View or get the system properties and configuration. This includes part numbers, serial numbers, group organization and detailed status for each module and group.
2. Quick diagnostic panel LED for each RFoF component; **Green** (OK) or **Red** (Failure).
3. Cage identification including: name, Image, location, and system event log.
4. Individual module level control, status and diagnostics.

Monitoring & Control via Inter-Facility Link

At times, RFoF cages are placed at remote sites that do not have access to LAN or the Web. RFOptic provides an Inter-Facility Link (IFL) feature by which the monitoring and control of the remote cage is done over the same bundle of fibers connecting the remote and local sites. With this IFL capability RFOptic provides an additional auxiliary Ethernet port for each cage such that that it is available to support additional remote site customer equipment.

ODL Monitoring & Control

RFOptic ODL systems provide a panel level control layer as well. Using an LCD and a 3-button navigation pad it is possible to control the system without any additional computer.

Summary

RFOptic's Monitoring & Control System can manage, monitor, and control RFoF converters locally and remotely. These control and monitor capabilities reduces the daily maintenance expense, allowing maintenance personnel to perform diagnostic tests and calibration in the field without special test equipment, and to locate faults and problems in the optical and RF domains. All M&C systems are user-friendly, intuitive and easy to operate. Additional information can be found in the help files of the M&C software.