Specifications

for a

Photonic/Optical Vector Analyzer

1. Introduction

The Naval Research Laboratory requires an optical test system for fast, accurate, and simultaneous characterization of the following parameters: insertion loss, polarization dependent loss, polarization mode dispersion, and the optical phase response from which the group delay and chromatic dispersion are calculated. The test system must also be able to characterize multiple back reflections within an optical device/system with high spatial resolution. The test system will be used to characterize passive optical components including fiber Bragg gratings and wavelength division multiplexing components.

2. Scope

The contractor shall deliver a complete optical vector analyzer test system, including a PC with installed software to allow rapid data collection and analysis. The test system must be able to characterize passive optical devices in transmission as well as reflection. The test system should also be capable of characterizing multiple devices under test spatial separated along a single optical fiber. Also the software provided by the contractor must be able to isolate and measure each device individually. The contractor must provide any accessories necessary for standard operation and must provide artefacts that can be used for calibration purposes.

3. Technical Requirements

The contractor shall provide a photonic/optical vector analyzer that meets or exceeds the following specifications.

3.1. Wavelength range

1525 nm to 1600nm

3.2. Absolute wavelength uncertainty/accuracy

± 1.5 pm

3.3. Wavelength resolution

1.6 pm

3.4. Insertion loss and polarization dependent loss specifications

3.4.1. **Loss uncertainty/accuracy**
±0.05 dB

3.4.2. **Measurement range**
60 dB

3.4.3. **Resolution**
±0.002 dB

3.4.4. **Polarization dependent loss uncertainty**
±0.03 dB

3.4.5. **Extinction ratio**
40 dB

3.5. Optical phase measurement uncertainty
0.0075 radians

3.6. Group delay uncertainty
±0.25 ps

3.7. Group delay range
150 ns

3.8. Maximum device optical path length
30m

3.9. Chromatic dispersion uncertainty
± 5 ps/nm

3.10. Polarization mode dispersion range
3 ns

3.11. Polarization mode dispersion accuracy
± 0.03 dB

3.12. Measurement time (excluding calibration)
< 30 seconds

3.13. Return loss specifications

3.13.1. **Dynamic range**
70 dB

3.13.2. **Sensitivity**
90 dB

3.13.3. **Resolution**
± 0.02 dB

3.13.4. **Accuracy**
± 0.15 dB

3.14. Test system input/output devices
IEEE-488/GPIB
Ethernet port
Hard drive >100GB
CDRW drive
Printer port
Standard user interfaces such as display, mouse, keyboard

3.15. Environmental specifications

3.15.1. **Operating temperature range**
10 to 35 °C
Relative humidity (non-condensing) < 80 %

4. Test data

The contractor shall provide certification that the test system meets required specifications.

5. Documentation

The contractor shall provide a manual that describes the operation of all the measurement modes of the instrument, calibration procedures, and trouble shooting procedures.

6. Technical support

The contractor shall provide telephone/fax/email support for a period starting with delivery of the instrument and extending 90 days after delivery.

7. Warranty

The contractor shall provide a standard commercial warranty for the instrument.