OPTICAL WAVELENGTH MULTIPLEXING TECHNOLOGIES for INFORMATION-RICH, NETWORKED PLATFORMS

HRL LABORATORIES

3011 Malibu Canyon Road, Malibu, CA 90265

Points of Contact:

Daniel Yap, Tel: 310-317-5360, Fax: 310-317-5485, Email: dyap@hrl.com

Willie Ng, Tel: 310-317-5704, Email: wwng@hrl.com

Greg Tangonan, Tel: 310-317-5208, Email: tangonan@hrl.com

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CHARACTERISTICS of a PHOTONIC MANIFOLD in a COMBINED INTER- / INTRA-PLATFORM NETWORK

INTER-PLATFORM COMMUNICATION:

- **SEAMLESS CARRIER-FORM TRANSDUCTION (OPTICAL FIBER, FREE-SPACE OPTICAL, WIRELESS MICROWAVE)**
- **DIRECT CONVERSION BETWEEN WIRELESS, OPTICAL-FIBER AND FREE-SPACE OPTICAL CARRIERS (WITHOUT CONVERTING BACK TO BASEBAND SIGNAL)**
- **COMBINED USE OF TIME MULTIPLEXING AND FREQUENCY MULTIPLEXING**
- **WAVELENGTH ROUTING (WAVELENGTH TRANSLATION ?) ALLOWS SEAMLESS CONVERSION BETWEEN OPTICAL FIBER NETWORK AND FREE-SPACE OPTICAL NETWORK**

INTRA-PLATFORM SIGNAL DISTRIBUTION, SWITCHING AND ROUTING:

- **OF BOTH ANALOG AND DIGITAL DATA**
- **FOR VARIETY OF MILITARY FUNCTIONALITIES**
- **INTERFACING TO VARIETY OF PROCESSORS, DISPLAYS, SENSORS, WAVEFORM SOURCES**

Transparent to type of modulation / multiplexing format

- **CONTROLLER-BASED RATHER THAN CONTENT-BASED ROUTING AND RECONFIGURATION**
- **OPTICAL-WAVELENGTH BASED *FRAMEWORK* FOR MULTIPLEXING, SWITCHING AND ROUTING**

Makes efficient use cabling and connectors

- **MIXTURE OF SECOND-LEVEL MULTIPLEXING FORMATS FOR NARROWER-BAND INFO (RF-SUBCARRIER MULTIPLEXING, TDMA AND CDMA)**

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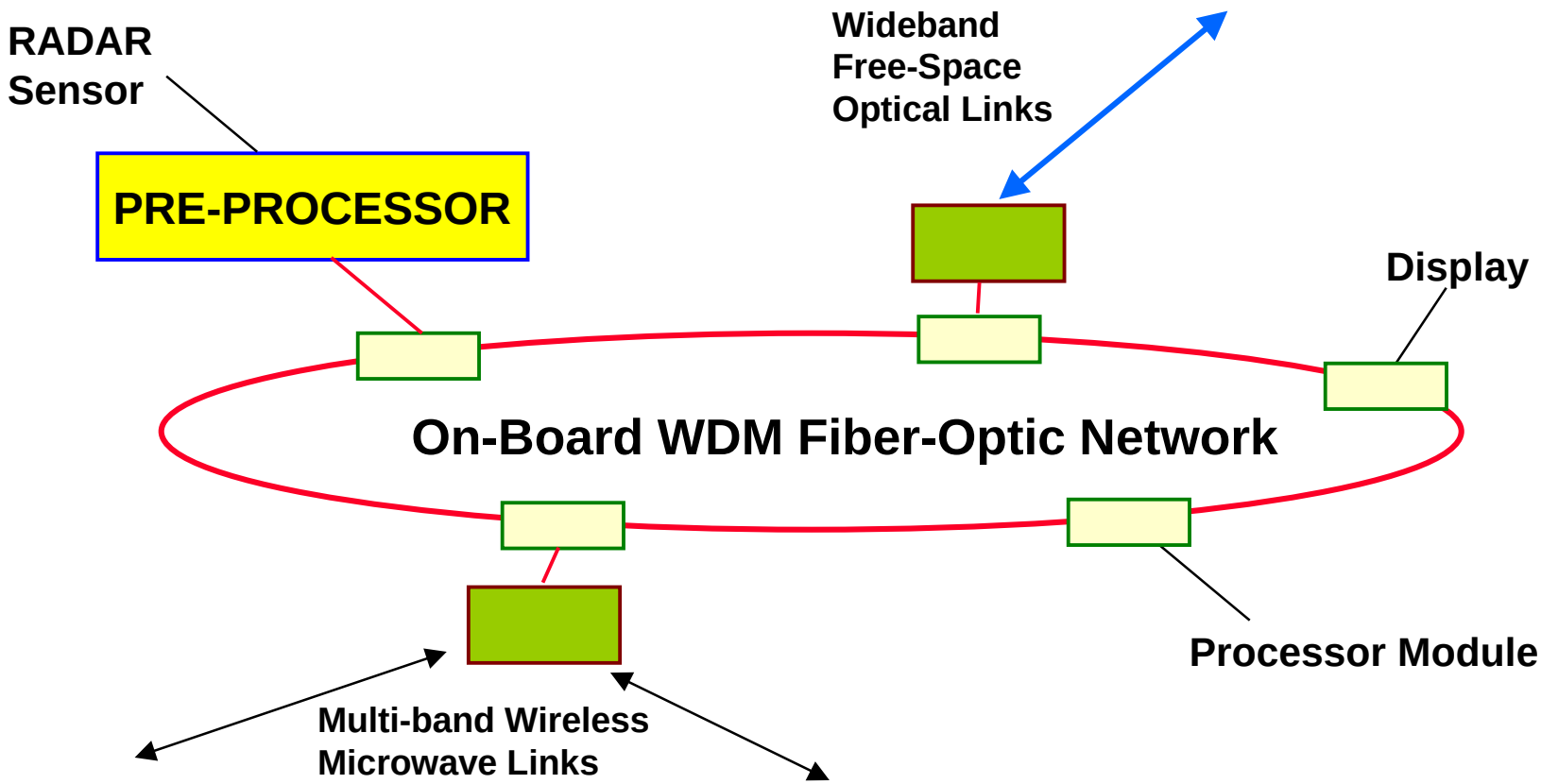
COMPONENTS FOR MULTI-FORMAT, MULTI-PLATFORM DATA NETWORKS



- WAVELENGTH SELECTIVE ADD / DROP MODULES (HIGH ISOLATION, NARROWER BW)
- RECONFIGURABLE WDM-BASED RF SIGNAL PROCESSORS (WIDEBAND, SHARP FILTERS)
- HIGH-FIDELITY TRANSDUCERS FOR FREE-SPACE OPTICAL LINKS
- CARRIER FORM, FREQUENCY BAND TRANSLATORS (TRANSPARENT TO DATA TYPE)

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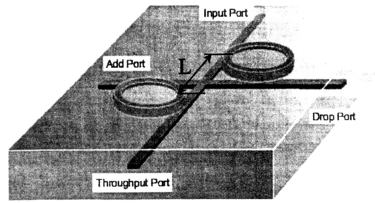
EXAMPLE: APPLYING WDM TECHNOLOGY TO NEEDS OF MILITARY PLATFORMS

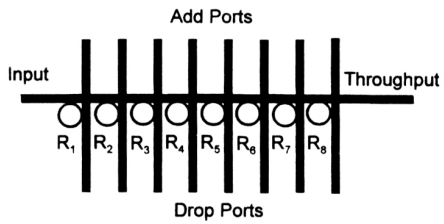
ALL-OPTICAL ADD/DROP MULTIPLEXER

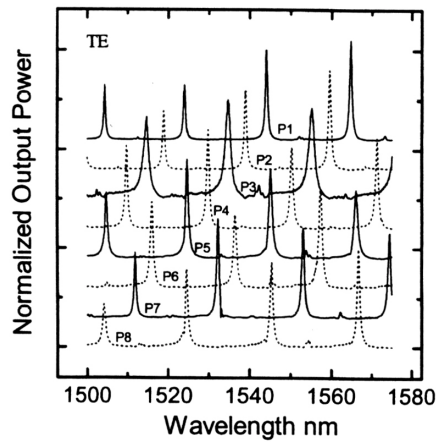
- **ADVANTAGE:**
  Transparent to Signal Format

- **NEED:**
  Tunable Passband and Bandwidth

Ref: S.T. Chu, B.E. Little, et al. (1999)





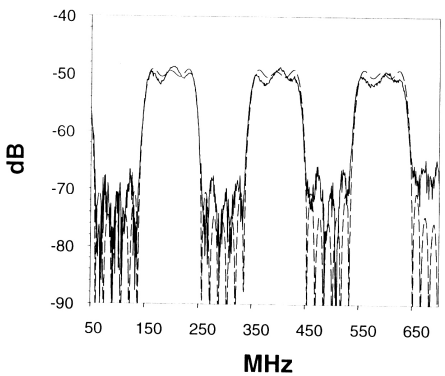


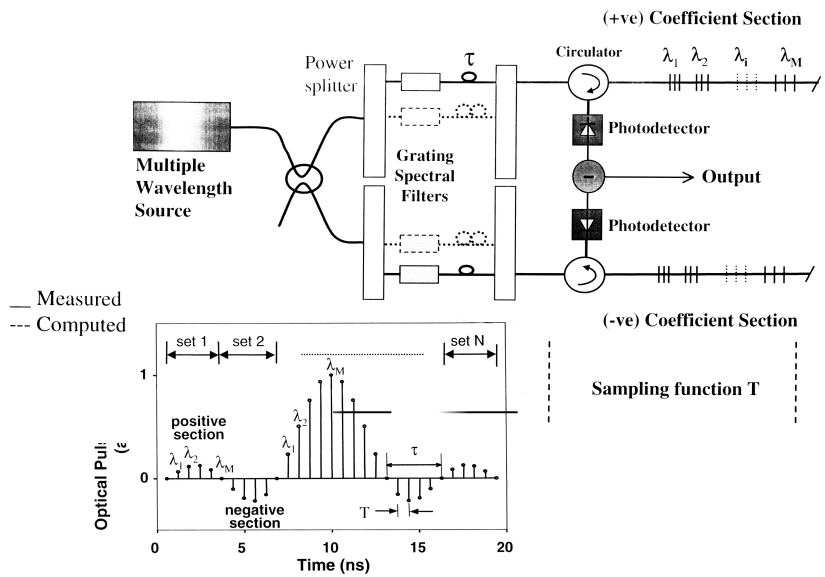
OPTICAL FIR FILTER

- **ADVANTAGE:**
  Frequency Independent Bandwidth & Shape

- **NEED:**
  Chip Scale Integration
  Power Efficient Components
  Low Noise Performance

Ref: N. You & R. Minasian (1999)





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