HIGHWAY OR LONG DISTANCE BACKHAUL SYSTEM
The beauty of fiber optic transmission is its low RF loss over long distances. Anacom offers fiber optic subsystems that can transmit over 20km, 30km or more. A trunk line system can be designed using bidirectional optical taps at the antenna sites. And with the use of WDM technology, fiber usage can be reduced by half or more.

WIRELESS LOCAL LOOP TRANSCEIVER
New wireless local loop systems are being designed with fiber antenna distribution as a fundamental system design approach. Systems designers are taking advantage of fibers ability to remote the RF heads and to consolidate the modulators at a common location. The AC 206-2.5 has a flat pass band up to 2.5 GHz. Optical splitters and combiners can be incorporated for unique optical system configurations.

IN-BUILDING DISTRIBUTED ANTENNA
Assure reliable and ubiquitous coverage with a fiber based distributed antenna system. Cost-effective fiber optic transceiver modules can be distributed throughout a building, mall, subway station or any location where consistent coverage is required. The head end unit can be located anywhere on the premises, as the performance of the system is maintained even over long fiber runs.

WDM TRANSCEIVER
Wavelength Division Multiplexing is an optical technique that allows two or more optical signals to be combined onto a single fiber. WDM is widely used to reduce fiber leasing costs. In a typical system, both the uplink and downlink paths are multiplexed onto a single fiber. In advanced system designs, a third channel for uplink antenna diversity is provided—all on one fiber.
WELCOME TO THE WIRELESS REVOLUTION

Whether you operate in the city, in the suburbs, over long highway runs or in-building, Anacom Systems Corporation offers you a fiber optic solution that will make your wireless network work reliably and ubiquitously. Anacom’s high performance, yet cost-effective rugged fiber optic transceivers give you the freedom to go far and wide, with impunity. Welcome to the wireless revolution.

CELLULAR BAND TRANSCiever

The AC 106 is optimized for use in the cellular band of 800 to 1000 MHz. This transceiver, as is the case with all our fiber optic transceivers, is transparent to the signal format or modulation technique. Higher power and high spur-free dynamic range options are available.

PCS TRANSCiever

The AC 206 is a high performance broadband transceiver optimized for PCS antenna remoting applications. It provides flat bandwidth from 1700 to 2200 MHz and a wide spur-free dynamic range greater than 100dB/Hz²/³. The unit utilizes advance MQW laser diode technology for stable wide temperature range performance.

RF ON FIBER™

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RF/Fiber Optic are used between the remote antenna and the base station. The remote unit usually includes an LNA for the uplink and a linear power amplifier for the downlink. If a common antenna is used for both transmit and receive, a duplexer ties the two paths together.
Fiber Optic transmission is the most efficient means to transmit Wireless and RF signals. Fiber cable has a much lower signal loss, is much lighter and is much less expensive than coaxial cable. For these reasons alone, fiber optics has grown to be a significant factor in the wireless revolution.

**Transmitter**
The fiber optic transmitter converts an RF signal into an optical signal at 1.3 μm. The input impedance of the transmitter is 50 ohms.
The output is an optical signal whose amplitude (or brightness) is proportional to the RF voltage input. This is referred to as direct or intensity modulation.
The laser diode driver circuitry utilizes optical feedback to maintain the optical output of the laser constant. An optical detector internal to the laser transmitter is used to monitor the output power and to adjust the bias current of the laser to maintain a constant average optical output. This assures consistency in performance, optimal linearity and maximum operating life of the system.

**Fiber & Connectors**
Singlemode fiber is the fiber of choice in RF / Fiber applications. The fiber has a core and cladding size of 9/125 μm. An optical connector aligns the cores for optimal stability and coupling of the light. Angle-polished connectors are used because they reduce the potential for optical reflections at the connector. Reflections in RF / Fiber systems cause increased noise and distortion. Scratches and dirt on the connector tip (female) will result in higher connector loss, and will cause reflections. The connector tip must always be kept clean. Use 99% alcohol and lint free wipes to clean the ferrule tips. Always replace the cap on the ferrule when the connector is not in use.

**Receiver**
The receiver uses a high-speed, high linearity PIN diode photodetector to convert the optical signal back to the RF domain. Low noise linear gain stages boost the signal back up to the desired RF level. A monitor is provided to indicate the optical power seen by the detector.

**Quality Assurance**
Constant and unrelenting efforts in the area of quality control are the small price we pay to earn our customers confidence in our products. From design through production to final test, our emphasis is on delivering a product that meets or exceeds your expectations. All of our fiber optic transmission modules and subsystems undergo temperature cycling, burn-in, and RF testing at elevated temperatures to assure stable, long term performance.
ANACOM SYSTEMS OFFERS A UNIQUE LINE OF COMPACT AND COST-EFFECTIVE TRANSMITTERS, RECEIVERS, TRANSCIEVERS AND SUBSYSTEMS FOR WIRELESS AND RF TRANSMISSION OVER FIBER OPTICS.

**APPLICATIONS**

**Distributed Antenna**
A typical antenna-remoting application requires the addition of a Low Noise Amplifier, a power amplifier and a duplexer. The far left side of the link would be connected to the radio equipment for demodulation down to the baseband channel. This approach is often used for in-building distributed antenna systems.

**Dual Transmission over Single Fiber**
Single fiber transmission is used to overcome a shortage of fiber or to realize a savings when fiber is leased at a recurring monthly cost. Whether the mode is bidirectional or multiple forward channels on a single fiber, a second transmitter is used at 1.55 um and the optical combining and splitting is done with a WDM or Wavelength Division Multiplexer.

**LMDS and Wireless Local Loop**
Fiber Optics permit you to consolidate your modulators and radio equipment at a common location. Fiber cables with their low loss are an ideal solution. Added benefits are immunity from EMI and lightning strikes.
Optical Reflections and noise and distortion
As with RF systems, reflections in RF / Optical systems are an issue. Optical reflections back into the laser diode cause a disturbance in the lasers gain cavity creating noise and distortion. The main sources of optical reflections are connector interfaces. A simple way to avoid most of the reflections at the interfaces is through the use of angle-polished connectors. The tip of an angle-polished, or APC connector is polished at an 8 degree angle. This is the optimal angle to minimize reflections from traveling back down the fiber into the laser. At this angle most reflections occurring due to the connector will be angled out of the fiber and dissipated harmlessly. Other general rules to minimize reflections: keep the connector tip clean and scratch free and always replace the cap onto the tip when the connector is not mated.

Wavelength Division Multiplexing - WDM
In fiber optic repeater applications where leasing fiber may be a costly proposition, WDM transceivers offer the means to transmit both the uplink and downlink signals onto the same fiber. This is achieved by using two laser transmitters operating at two different wavelengths - one at 1.2um and the other at 1.5um. For diversity antenna applications, a 3 channel, one fiber system is used - one downlink and two uplinks.

SYSTEM DESIGN
An RF / Fiber Optic link can be modeled as an RF gain stage. The link has a 50-ohm input and output and just a 50-ohm gain block has (1) RF Gain, (2) Input Noise an (3) an Intercept Point. These three factors are defined at a given optical loss or fiber distance. As the fiber distance between the transmitter and receiver changes, all three parameters will change. Shown here in this graph is the typical relationship between these three parameters and optical loss.

RF on Fiber® Basics
Fiber Optics have been used widely and successfully in digital telecommunications systems and analog CATV systems. These systems capitalize on fibers high bandwidth and low loss. Anacom Systems Corp has advanced the state-of-the-art by developing a means to transmit RF signals over fiber linearly and nearly transparently. In RF on Fiber® systems, the RF signal directly modulates, at frequency, the bias current of a semiconductor laser diode that is internally matched to 50 ohms. Internal optical feedback is used to monitor the lasers condition and adjust the bias quiescent point for maximum dynamic range. The receiver is composed of a high-speed linear photo-detector that is also matched to 50 ohms.

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### Fiber Optic Accessories

**Fiber Cable**  
Singlemode Fiber, terminated with optional connectors  
Example 1: SMF1mFC/APC  
Description: singlemode fiber cable, 1 meter length, FC/APC connectors on both ends

Example 2: SMF25mFC/APC  
Description: singlemode fiber cable, 25 meter length, FC/APC connectors on both ends

Example 3: SMF1.1kmSC/APC  
Description: singlemode fiber cable, 1.1 kilometer length, SC/APC connectors on both ends

**Fiber Optic Connector Mating Adapters**  
Bulhead type adapter for mating two male fiber optic connectors  
MA-FC: FC type mating adapter  
MA-SC: SC type mating adapter

**Fiber Optic Couplers/Splitters**  
Singlemode Fiber combiners and/or splitters, Specify number of inputs for couplers and splitting ratio for splitters.  
Example 4: AC 1x2FC/APC  
Description: Three to one singlemode coupler/splitter, FC/APC connectors on all ports

Example 5: AC 10/90FC/APC  
Description: 10% fiber optic splitter (“tap”) with FC/APC’s

**Product Features**  
Product features include optically stabilized transmitters for wide temperature range, single power supply operation, Monitors and alarms for enhanced system features.  
Bidirectional transmission over a single fiber and very high dynamic range performance for transparent transmission.

### PRODUCT SPECIFICATIONS

#### PRODUCTS BY MODEL NUMBER

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#### MODULES - COMPACT DC POWERED UNITS

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>TYPE</th>
<th>BANDWIDTH</th>
<th>OUTPUT NOISE</th>
<th>IIP3</th>
<th>COMMENTS</th>
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<tr>
<td>AC 102</td>
<td>IF Link</td>
<td>5 to 100 MHz</td>
<td>+10 dB @ 1 km</td>
<td>-155</td>
<td>+20 dBm</td>
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<td>AC 105</td>
<td>Cellular Band Transceiver</td>
<td>50 to 150 MHz</td>
<td>+10 dB @ 1 km</td>
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<td>+20 dBm</td>
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<td>AC 106</td>
<td>Low Noise</td>
<td>100 to 1000 MHz</td>
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<td>+20 dBm</td>
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<tr>
<td>AC 108-4.8</td>
<td>SMOM</td>
<td>2.5 to 1000 MHz</td>
<td>+10 dB @ 1 km</td>
<td>-155</td>
<td>+20 dBm</td>
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<td>AC 123</td>
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<td>AC 1106</td>
<td>Distribution Pack</td>
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<td>AC 1100</td>
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<td>AC 1102</td>
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#### 19 inch SUBRACK UNITS WITH INTERNAL POWER SUPPLY

<table>
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<tr>
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**Wireless Antennae**
RF ON FIBER™
ANACOM GIVES YOU THE FREEDOM TO GO FAR AND WIDE

So far with your repeater, microcell and back-hauling systems needing a remote antenna from the base station. Anacom’s high performance RF/Fiber Optic modules give your system the capability to transmit 30km, 20km or more - all at <1 dB/km RF loss.

Cover wide areas in your distributed antenna, in-building or pico-cell systems requiring reliable coverage over a large area. Cost-effective RF/Fiber Optic transceivers allow you to remote dozens of low power antenna with impunity.

Anacom’s proprietary RF/Fiber Optic transceivers are rugged, compact OEM modules designed for easy integration into your AMPS, GSM, PCS/PCN, LMDS, WLL, IF or other antenna system. Anacom’s responsive product support group and flexible volume manufacturing methods assure you an efficient design and a successful transition to production. Welcome to the wireless revolution.

FIBER IS IN HIGH DEMAND
SEE WHY FIBER IS IN HIGH DEMAND FOR WIRELESS SYSTEMS AND WHY ANACOM HAS ESTABLISHED AN OUTSTANDING TRACK RECORD AS THE SUPPLIER TO THE FIBER & WIRELESS INDUSTRY.

ABOUT THE COMPANY...
Anacom Systems Corporation designs, manufactures, and markets a unique line of fiber optic links used to transmit Wireless and RF signals. The product line includes transmitter and receiver modules as well as complete subsystems. These fiber optic links are used worldwide by wireless communication system OEM’s, RF system integrators and military system designers. The company was founded to design and bring to market a new class of fiber optic communications equipment. This new class of products was needed for an emerging, explosive new field: Wireless Communications. These wide ranging wireless applications cover many communications systems, many of which involve the transmission or reception of signals by an antenna.

Anacom Systems Corporation developed a proprietary technology that permitted new performance levels in linear modulation of semiconductor laser diodes. This new technology permitted for the first time the widespread use of fiber optics in a broad range of RF systems. RF/Fiber Optics overcomes the problems of signal loss, EMI, long distance transmission, and distribution to multiple locations. It is an elegant way to remote radio and base station equipment from the signal source such as an antenna or modulation equipment. Welcome to the Wireless Revolution.