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# Wideband Analog Transport
# Microcell Optical Link Service
# Type C Arrangements
# Interface and Performance Specifications

Technical
Reference

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This Technical Reference describes the network interface and service performance specifications when an arrangement denoted Type C is employed. Microcell Optical Link Service is intended to provide broadband transport over fiber optic media of signals within the radio frequency spectrum used for cellular mobile telephone services in the United States. This service is available in more than one arrangement.

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# WIDEBAND ANALOG TRANSPORT MICROCELL OPTICAL LINK SERVICE – TYPE C ARRANGEMENT INTERFACE AND PERFORMANCE SPECIFICATIONS

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# WIDEBAND ANALOG TRANSPORT
# MICROCELL OPTICAL LINK SERVICE – TYPE C ARRANGEMENT
# INTERFACE AND PERFORMANCE SPECIFICATIONS

## 1. Introduction

### 1.1 General

Microcell Optical Link Service is intended to provide broadband transport over fiber optic media of signals within the radio frequency spectrum used for cellular mobile telephone services in the United States. This document describes the network interface and service performance specifications when an arrangement denoted Type C is employed. This service is available in more than one arrangement.

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### 1.2 Purpose

The purpose of this document is to provide customers, service providers and equipment manufacturers with the performance specifications and interface requirements associated with Microcell Optical Link Service.

### 1.3 Revisions

When revisions to this document are issued, this paragraph will provide a summary of the reasons for the revisions.

## 2. Service Description

### 2.1 Overview

Microcell Optical Link Service provides for the bi–directional transport of signals within the radio frequency spectrum bandwidth of 824 MHz to 894 MHz assigned to cellular mobile telephone service in the United States. This service would typically be employed for transport of cellular service signals between a cellular mobile carrier's Microcell site and a Host site.

## 2.2 Architecture

Cellular RF bandwidth signals carried by a Microcell Optical Link Service channel will be transported between sites over single−mode fiber optic transmission media. Interfaces to the channel are portrayed in Figure 1.

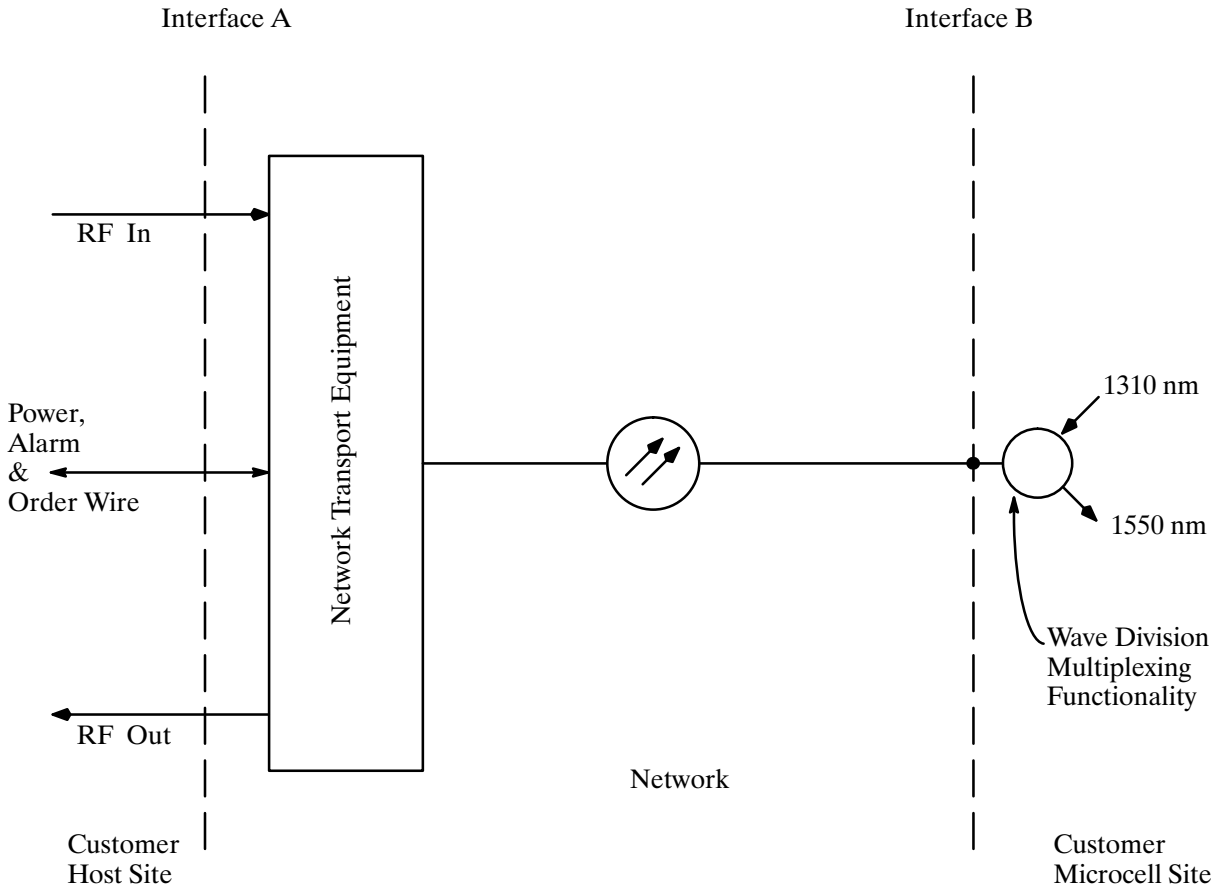


**Figure 1**

The Broadband RF electrical signals presented as an input to the Microcell Optical Link Service channel at Network Interface A are sampled and converted to a digital bit stream. The serial bit stream is used to modulate a 1550 nm laser via a two−level intensity modulation process. The optical signal is then wavelength division multiplexed with the 1310 nm signal receiver from the Microcell site.

The transport is via a single fiber. The transport distance for the Microcell Optical Link Service is limited by the insertion loss of the optical fiber to be less than 27 db as measured at an optical wavelength of 1550 nm.

Power for the Network Transport Equipment at the Host site shall be provided by the customer in accordance with Section 3.1. No power requirements exist across Network Interface B at the Microcell site.

An alarm messaging channel is presented to the customer across Network Interface A as specified in Section 3.1. Alarms are not monitored from the network. It is the responsibility of the customer to notify BST when maintenance action is required.

The capability to establish voice communications between Interfaces A and B via an order wire channel is provided.

Utilization of either the alarm or order wire capability requires functionality at the Microcell site, similar to that provided in the Network Transport Equipment at the Host site.

## 3. Interface Specifications

### 3.1 Network Interface A

Network Interface A consists of three components as indicated in Figure 1. Connectors J0 and J1 are the RF signal input and output connectors. The Power, Alarm and Order Wire circuits employ a cable stub at the interface.

#### 3.1.1 Mechanical

This interface consists of two connectors and an unterminated cable stub.

Connectors J0 and J1 are each standard 50 ohm TNC female coaxial connectors (AMP type 228502−1 or equivalent).

The lead assignments for the unterminated cable stub are color−coded as shown in Table 1, below.

**Table 1**

| LEAD ASSIGNMENTS | |
|---|---|
| **Function** | **Color** |
| +24 VDC | dark brown |
| analog ground | gray |
| digital ground | green |
| +24 VDC | red |
| analog ground | violet |
| digital ground | orange |
| order wire (+) | blue |
| order wire (−) | white |
| RS−485 alarm interface (+) | yellow |
| RS−485 alarm interface (−) | black |
| all other wires | unused |

### 3.1.2 Electrical

Broadband RF electrical signals are presented by the customer to the Microcell Optical Link Service channel via the RF input connector, J0. Electrical specifications are contained in Table 2 below.

**Table 2**

| RF INPUT (J0) ELECTRICAL SPECIFICATIONS | |
|---|---|
| Impedance | 50 Ohms (nominal) |
| Bandwidth | 12.5 MHz, either<br>869 to 880 MHz and 890 to 891.5 MHz (Band A), or<br>880 to 890 MHz and 891.5 to 894 MHz (Band B) |
| Maximum Signal Level | −30 dBm |

Broadband RF electrical signals are presented to the customer as an output of the Microcell Optical Link Service channel via the RF output connector, J1. Electrical specifications are contained in Table 3 below.

**Table 3**

| RF OUTPUT (J1) ELECTRICAL SPECIFICATIONS | |
|---|---|
| Impedance | 50 Ohms (nominal) |
| Bandwidth | 12.5 MHz, either<br>824 to 835 MHz and 845 to 846.5 MHz (Band A), or<br>835 to 845 MHz and 846.5 to 849 MHz (Band B) |
| Maximum Signal Level | 0 dBm |

The maximum current on either of the +24 volts DC leads is 1.5 amperes. The voltage on either lead shall be maintained between +21.0 and +27.0 volts, with respect to ground. The peak−to−peak ripple on either lead shall not exceed 500 millivolts.

A 9600 bps alarm messaging channel is provided. This channel is bi−directional and conforms to EIA RS−485 specifications. The data consists of 8 data bits with 1 start bit, 1 stop bit and no parity.

The order wire channel is intended to be connected to a two−wire circuit with DC loop current, e.g., a Central Office line.

Both the alarm messaging channel and the order wire channel are multiplexed in the digital optical signal. Functionality is required in the customer's microcell equipment to provide either of these capabilities. Since both capabilities are transparent to the Network, neither is described further.

### 3.2 Network Interface B

#### 3.2.1 Physical

This interface employs one connector. Both the Optical Output and Optical Input operate at different optical wavelengths across a single−position fiber optic SC−type male connector.

#### 3.2.2 Optical

Optical signal specifications are contained in Table 4, below.

**Table 4**

| INTERFACE B<br>OPTICAL SIGNAL SPECIFICATIONS | |
|---|---|
| Wavelengths | 1550 ± 20 nm (from the Network)<br>1310 ± 20 nm (from the Customer) |
| Fiber | 9/125 Single Mode<br>8.3 μm diameter core (nominal) |
| Maximum Signal Level<br>(with no modulation) | +5 dBm (from the Network)<br>+6 dBm (from the Customer) |

## 4. Modulation

Documentation is available from ADC Kentrox, a subsidiary of ADC Telecommunications, Inc., pursuant to the non−disclosure requirements of ADC Kentrox.

Contact;

General Manager − Wireless Systems
ADC Kentrox
P. O. Box 10704
Portland, Oregon 97210−0704
Telephone (503) 643−1681

## 5. Environmental Requirements

### 5.1 Space

Space to house the Network Transport Equipment provided at the Host site shall be provided by the customer. The space requirements are specified in Table 5.

**Table 5**

| HOST SITE SPACE REQUIREMENTS | |
|---|---|
| Height | 17 inches |
| Width | 23 inches |
| Depth | 9.0 inches |

### 5.2 Temperature

The temperature of the Network Transport Equipment located at the Host site shall be maintained between 0° C and +35° C.

### 5.3 Humidity

The humidity of the Network Transport Equipment located at the Host site shall be maintained between 10% and 95%, non−condensing.

## 6. Service Performance Specifications

These specifications apply to the end−to−end electrical channel. They are based on the assumption that the customer's equipment at the Microcell site employs modulation and de−modulation techniques that are identical to those used in the Network Transport Equipment.

### 6.1 Attenuation Distortion

Attenuation distortion will not exceed ± 3.0 dB between the band edges identified in Table 2 and Table 3.

### 6.2 Noise Contribution

The noise contributed by the network may be represented as a noise source, having a Power Spectral Density of no more than −115 dBc/Hz, injected at the RF input interfaces of the Microcell Optical Link Service channel.

### 6.3 Intermodulation Distortion

Third order intermodulation distortion products will be limited and be at least 95 dB below the composite signal as measured by a traditional two−tone method.

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