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# Wideband Analog Transport Microcell Optical Link Service Type B Arrangement 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 B 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 B ARRANGEMENT
# INTERFACE AND PERFORMANCE SPECIFICATIONS

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## 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 B 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 this particular arrangement of 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

This arrangement of Microcell Optical Link Service provides for the transport of signals in the passband of 869 – 894 MHz in one direction. Transport for signals in the passband at 824 – 849 MHz is provided in the reverse direction. A second channel at 702–727 MHz is also available in the reverse direction. This service would typically be employed for transport of cellular service signals between a cellular mobile carrier's radio frequency (RF) transceiver location ("microcell site") and another location ("host site"). The passband between 702 and 727 MHz is intended to accommodate a diverse receive channel from the microcell site.

### 2.2 Architecture

Figure 1 portrays the interfaces to this service. The interface designated Network Interface "A" is an electrical interface and the interface designated Network Interface "B" is an optical interface.

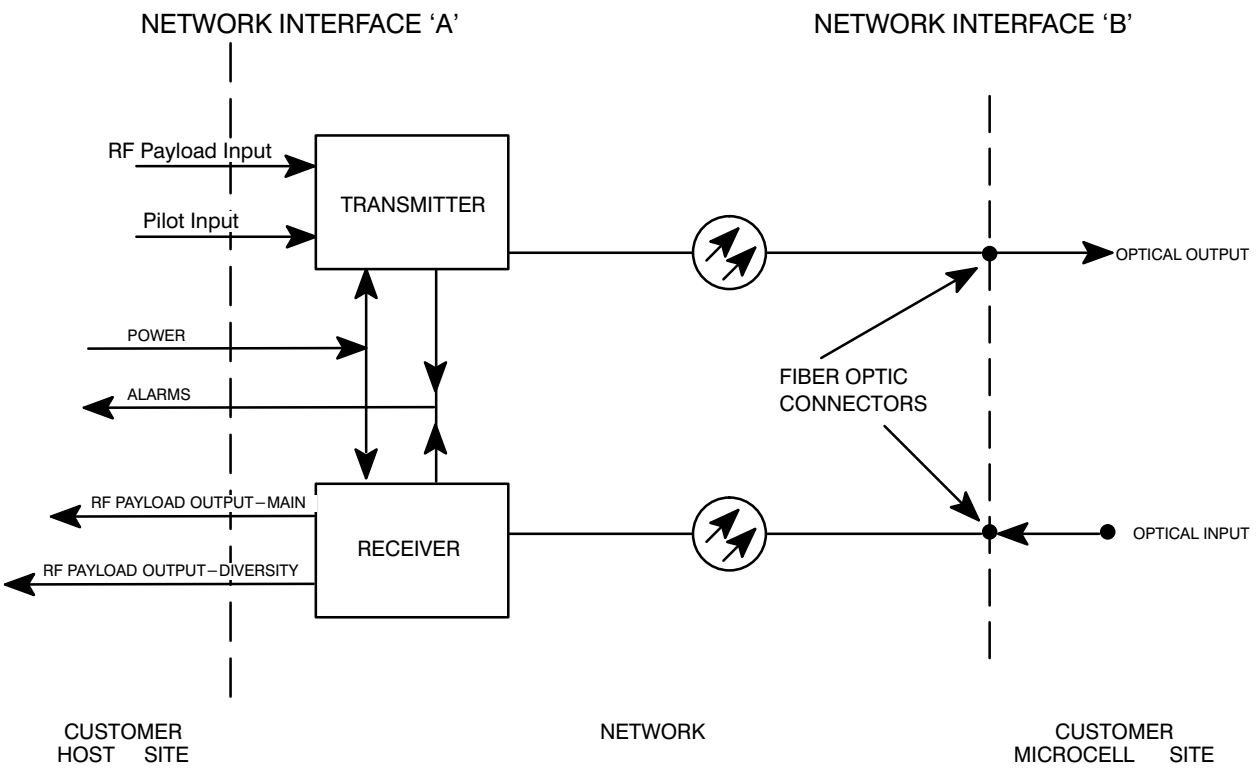


**Figure 1**

The RF electrical signal presented as an input at Network Interface "A" is converted to an optical signal via intensity modulation. The optical signal presented at Network Interface "B" can be converted to an RF electrical signal by de−modulating the intensity of the received optical signal.

Alarm outputs are presented to the customer across Network Interface "A" at the host site as specified in Section 3.1. These alarms are not monitored from the network − it is the responsibility of the customer to notify BellSouth Telecommunications, Inc. when maintenance action is required.

Power and space for the network equipment located adjacent to Interface "A" shall be provided by the customer.

## 3. Interface "A" Specifications

### 3.1 General

Network Interface "A" consists of five parallel connectors as indicated in Figure 1. They are:

i RF Payload Input
ii Pilot Input
iii Power and Alarm
iv RF Payload Output−Main
v RF Payload Output − Diversity

### 3.2 Mechanical

#### 3.2.1 General

All network equipment connectors are female.

#### 3.2.2 RF Connectors

The RF Payload Input, Pilot Input, RF Payload Output − Main, and RF Payload Output − Diversity circuits utilize coaxial connectors, CINCH* Part No. CN0961R25C5 or equivalent.

#### 3.2.3 DC Connector

The Power and Alarm circuits utilize a multipin connector, Berg Electronics** Part No. 104448949 or equivalent. Pin assignments are provided in Table 1.

**Table 1**

| Pin | Usage | Signal |
|---|---|---|
| 0 to 21 | Not used | – |
| 22 | Alarm Output | Local Oscillator out of Lock |
| 23 | Alarm Output | Low Average Received Optical Power |
| 24 | Alarm Output | Failure in Laser Diode Circuit |
| 25 to 50 | Not used | – |
| 51 to 56 | Power | +24 Volts DC |
| 57 to 217 | Not used | – |
| 218 to 224 | Ground | – |
| 225 to 231 | Not used | – |
| 232 to 250 | Ground | – |
| 251 to 256 | Power | 24 Volts Return |

* CINCH, 1501 Moise Ave., Elk Grove Village, IL 60007

** Berg Electronics, 150 Corporate Center Dr., Suite 201, Camp Hill, PA 17011

### 3.3 Electrical

#### 3.3.1 RF Connectors

##### 3.3.1.1 Impedance

The impedance of each of the RF circuits is 50 Ohms, nominal.

##### 3.3.1.2 RF Payload Input

The Bandwidth of the RF Payload Input circuit is 869 to 894 MHz. The maximum signal level presented by the customer on this circuit shall be −34 dBm.

##### 3.3.1.3 Pilot Input

The customer shall provide a 15 MHz sinusoidal reference signal at the Pilot Input. The signal level shall be between −20 and 0 dBm.

##### 3.3.1.4 RF Payload Output − Main

The bandwidth of the RF Payload Output − Main circuit is 824 − 849 MHz. The maximum signal level that will be delivered is +2 dBm.

##### 3.3.1.5 RF Payload Output − Diversity

Signals received, from Interface 'B', in the passband of 702 to 727 MHz will be shifted in frequency by the network. They will be shifted to the 824 to 849 MHz band and presented at the RF Payload Output − Diversity connector. The maximum signal level that will be delivered is +2 dBm.

#### 3.3.2 DC Connector

The voltage on pins 051−056 shall be between 23.0 and 26.0 VDC. The maximum current drawn through the Power and Alarm connector is 1.7 amperes. The peak−to−peak ripple voltage present on the +24 VDC leads shall not exceed 200 millivolts.

The Alarm Outputs are operated at standard TTL logic levels. Alarms are indicated by providing a current sink to ground. Customer supplied voltages used to sense alarms shall be biased positive with respect to ground and shall not be greater than 5.25 V. The current supplied by the customer shall not be greater than 16 milliamperes.

## 4. Network Interface "B"

### 4.1 Mechanical

This interface employs two type SC connectors. Both network equipment connectors are male.

### 4.2 Optical

Each mated pair of SC connectors shall have a maximum back reflectance of −40 dB. The optical wavelength of both the signal generated in the network and that generated by the customer shall be 1310 ± 20 nanometers. The fiber employed by the customer shall be single mode, with a 8.3 micron (nominal) core.

With no modulation applied, the following signal level specifications shall be met:

| Signal delivered by: | Minimum (dBm) | Maximum (dBm) |
|---|---|---|
| The Network | −4.0 | +7.0 |
| The Customer | +5.0 | +7.0 |

## 5. Transport

### 5.1 A to B

The RF signal presented by the customer as an input at the RF Payload Input and a 30 MHz reference signal derived from the Pilot Input signal are combined to form the modulated signal delivered, after optical transport, at Interface B.

The Pilot Input, when provided at 0 dBm, results in 2.9% modulation, nominal. The RF Payload Input, when provided at −45 dBm at interface A, also results in 2.9% modulation, nominal.

### 5.2 B to A

The optical signal presented at Network Interface "B" by the customer as an input to Interface 'B' is demodulated after optical transport to form the RF Payload Output and RF Payload Output − Diversity at Network Interface "A".

An RF signal in the frequency range of 824 to 849 MHz is delivered as the RF Payload Output − Main signal at Network Interface A. The signal is demodulated to provide a signal level of −45 dBm, nominal, when the intensity of the optical signal is modulated at 2.9%.

An RF signal in the frequency range of 702 to 727 MHz, if present, is frequency translated to the 824 to 849 MHz band, and delivered as RF Payload Output − Diversity. The signal is demodulated to provide a signal level of −45 dBm, nominal, when the intensity of the optical signal is modulated at 2.9%.

An RF signal at 30 MHz shall be present. The intensity of the optical signal shall be modulated by 2.9%, nominal, by this signal.

## 6. Equipment Space

### 6.1 Dimensions

The customer shall provide space to house network equipment adjacent to Network Interface 'A'. The space required is 7.7″ by 3.0″ by 14.4″.

### 6.2 Environment

The temperature and humidity of the environment shall be maintained within the following limits:

| | Temperature | Humidity |
|---|---|---|
| long−term | +10° to +35°C | 20 to 60 % |
| short−term | +2° to +49°C | 0 to 90 % |

Operation outside of the long−term limits (but within the short−term limits) shall be limited to 72 continuous hours, and 15 days per year.

## 7. Service Performance Specifications

### 7.1 General

These parameters apply to the path from Interface 'A' to Interface 'B'.

### 7.2 Attenuation Distortion

Attenuation distortion within the passbands specified herein shall not exceed $\pm$ 1.0 dB.

### 7.3 Noise Contribution

The noise contributed by the network may be represented as a noise source, having a Power Spectral Density of no more than −110 dBc/Hz, injected at the RF Input interfaces.

### 7.4 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.