

Torres-Rojas, Genara

From: nsabourin@hinckleyallen.com
Sent: Wednesday, January 27, 2016 4:52 PM
To: Olivencia, Mildred
Cc: Torres-Rojas, Genara; Van Duyne, Sheree; Ng, Danny; Shalewitz, William
Subject: Freedom of Information Online Request Form

Information:

First Name: Nathan
Last Name: Sabourin
Company: Hinckley, Allen & Snyder, LLP
Mailing Address 1: 30 South Pearl Street, Suite 901
Mailing Address 2:
City: Albany
State: NY
Zip Code: 12207
Email Address: nsabourin@hinckleyallen.com
Phone: 518-396-3100
Required copies of the records: Yes

List of specific record(s):

In connection with a construction project commonly known as the Holland Tunnel 800 MHz In Building RF Coverage Enhancement project, we seek the following records: 1 requests for FCC-Type approval submitted to Port Authority for equipment to be provided by Fiber-Span, Inc. 2 requests for FCC-Type approval submitted to Port Authority for equipment to be provided by Zen Industrial Services, LLC 3 requests for FCC-Type approval submitted to Port Authority for Type 1 Head-End Multi-Channel DSP-Based Integrated BDA Equipment 4 approvals andor rejections provided by Port Authority for Type 1 Head-End Multi-Channel DSP-Based Integrated BDA Equipment 5 requests for FCC-Type approval submitted to Port Authority for Type 2 Remote Fiber-Fed Broadband BDA and, 6 approvals andor rejections provided by Port Authority for Type 2 Remote Fiber-Fed Broadband BDA.

THE PORT AUTHORITY OF NY & NJ

FOI Administrator

February 23, 2016

Mr. Nathan Sabourin
Hinckley, Allen & Snyder, LLP
30 South Pearl Street, Suite 901
Albany, NY 12207

Re: Freedom of Information Reference No. 16637

Dear Mr. Sabourin:

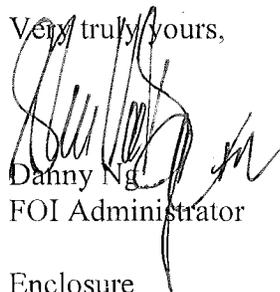
This is in response to your January 27, 2016 request, which has been processed under the Port Authority's Freedom of Information Code, copy enclosed, for "copies of the following records: 1. requests for FCC-Type approval submitted to Port Authority for equipment to be provided by Fiber-Span, Inc. 2. requests for FCC-Type approval submitted to Port Authority for equipment to be provided by Zen Industrial Services, LLC 3. requests for FCC-Type approval submitted to Port Authority for Type 1 Head-End Multi-Channel DSP-Based Integrated BDA Equipment 4. approvals and/or rejections provided by Port Authority for Type 1 Head-End Multi-Channel DSP-Based Integrated BDA Equipment 5. requests for FCC-Type approval submitted to Port Authority for Type 2 Remote Fiber-Fed Broadband BDA and, 6. approvals and or rejections provided by Port Authority for Type 2 Remote Fiber-Fed Broadband BDA."

Please be advised that we have searched our files and found no documents responsive to Nos. 1, 2, 3 and 5 of your request.

Material responsive to Nos. 4 and 6 of your request can be found on the Port Authority's website at <http://corpinfo.panynj.gov/documents/16637-o/>. Paper copies of the available records are available upon request.

Please refer to the above FOI reference number in any future correspondence relating to your request.

Very truly yours,



Danny Ng
FOI Administrator

Enclosure

4 World Trade Center, 18th Floor
150 Greenwich Street
New York, NY 10007
T: 212 435 3642 F: 212 435 7555



THE PORT AUTHORITY OF NY & NJ

TRANSMITTAL

No. 00123

241 Erie Street
Jersey City, NJ 07310

Phone: 201-595-4751

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 7/1/2015

TO: Tishman Technologies
2 Gateway Center
17th Floor
Newark, NJ 07102

Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: Gary Dragona

| WE ARE SENDING: | STATUS LEGEND: | | SUBMITTED FOR: |
|--|---|--------------------------------|---|
| <input type="checkbox"/> Shop Drawings | Approved (APP) | New Item (NEW) | <input type="checkbox"/> Approval |
| <input type="checkbox"/> Letter | Approved as Corrected (AAC) | Not Approved (NA) | <input type="checkbox"/> Your Use |
| <input type="checkbox"/> Prints | Approved as Noted (AAN) | Not Reviewed (NR) | <input type="checkbox"/> As Requested |
| <input type="checkbox"/> Change Order | For Record Only (FRO) | Review With Comments (RWC) | <input type="checkbox"/> Review and Comment |
| <input type="checkbox"/> Plans | For Your Information (FYI) | Review With No Comments (RWNC) | |
| <input type="checkbox"/> Samples | Incomplete (INC) | Superseded (SUPS) | |
| <input type="checkbox"/> Specifications | SENT VIA: | | DUE DATE: |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Attached <input type="checkbox"/> Separate Cover Via: File Interoffice | | |

| PACKAGE | SUBMITTAL | DWG. # | REV. | COPIES | DATE | DESCRIPTION | STATUS |
|---------|-----------|--------|------|--------|----------|-------------|--------|
| 16785 | 16785-052 | | R000 | 4 | 7/1/2015 | Canam BDA | AAN |

() Please make necessary corrections as noted, if any. Place approval form on original of each approved drawing or cut, insert date of approval within same and return _____ prints each. IT IS REQUESTED THAT THESE PRINTS BE RETURNED TO US WITHIN 5 DAYS.

() CLEAR TRANSPARENCY REQUIRED

The Contract required that the Contractor shall furnish to the engineer one set of drawings, all clearly revised, completed and brought up-to-date showing all of the permanent equipment, materials and construction as actually used.

Your earliest attention to these items would be greatly appreciated so as to avoid delay in the progress of the job.

Very Truly Yours,

Signed: _____

Edward Chang

CC: Transmittal Only: E. Chang

One Copy: Doc. Control / Two Copies: A. Kaprielian

RCC Consultants, Inc.

100 Woodbridge Center Drive
Ste 201
Woodbridge, NJ 07095



Phone: (732) 404-2481
Fax: (732) 404-2580

TRANSMITTAL

No. 00048

PROJECT: HT IN-BUILDING

DATE: 6/25/2015

TO: Port Authority of NY & NJ
241 Erie Street
PANYNJV02881
Jersey City, NJ 07310

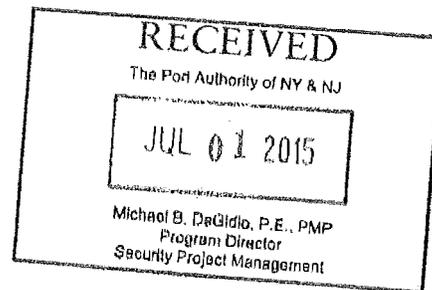
REF: MF-100.511 WO#21
HT IN-BUILDING

ATTN: Amalia Fowler

| WE ARE SENDING: | SUBMITTED FOR: | ACTION TAKEN: |
|---|--|---|
| <input type="checkbox"/> Shop Drawings | <input type="checkbox"/> Approval | <input type="checkbox"/> Approved as Submitted |
| <input type="checkbox"/> Letter | <input checked="" type="checkbox"/> Your Use | <input checked="" type="checkbox"/> Approved as Noted |
| <input type="checkbox"/> Prints | <input checked="" type="checkbox"/> As Requested | <input type="checkbox"/> Returned After Loan |
| <input type="checkbox"/> Change Order | <input type="checkbox"/> Review and Comment | <input type="checkbox"/> Resubmit |
| <input type="checkbox"/> Plans | | <input type="checkbox"/> Submit |
| <input type="checkbox"/> Samples | SENT VIA: | <input type="checkbox"/> Returned |
| <input type="checkbox"/> Specifications | <input checked="" type="checkbox"/> Attached | <input type="checkbox"/> Returned for Corrections |
| <input checked="" type="checkbox"/> Other: CUT SHEETS | <input type="checkbox"/> Separate Cover Via: | <input type="checkbox"/> Due Date: |

| ITEM | PACKAGE | SUBMITTAL | DRAWING | REV. | ITEM NO. | COPIES | DATE | DESCRIPTION | STATUS |
|------|---------|-----------|---------|------|----------|--------|-----------|-------------|--------|
| | 1678 | 052 | | 0 | 1 | 7 | 6/25/2015 | CANAM BDA | AAN |

Remarks: NOTE: BDA PART # M4D-10C806-3R-K3



CC:

Signed: _____

Beng Connell



Canam Technology Inc.

RECEIVED JUN 25 2015



MARK-IV DIGITAL Class-A Narrowband and Signal Booster Public Safety 800 MHz Analog and Digital P25, TETRA & TETRAPOL

RECEIVED JUN 27 2015

BY: _____

Model: M4DBDA8
FCC ID: TCJ- M4DBDA8



The CTI MARK-IV DIGITAL NARROWBAND SIGNAL BOOSTER, integrates two sets of front-end programmable narrowband filters with multi-carrier power amplifiers, to deliver a Bi-Directional Narrowband Signal Booster. The

Individual AGC per channel feature essentially reduces the uplink near-far concern prevalent in many Public Safety broadband DAS systems.

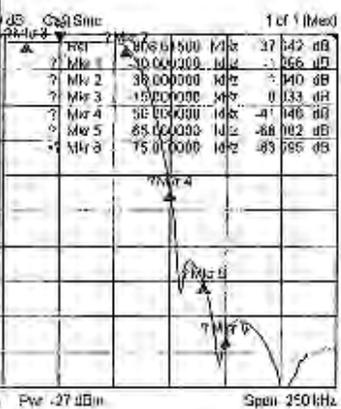
Fiber-fed models are available, with or without the Multi-Carrier Power Amplifier (MCPA) stages.

The filter's bandwidths & selectivity are software-defined and could be field-changed at any time by uploading factory-supplied personality files. Among several options, we can achieve very narrow filters windows, such as, for example, 70 dB rejection at 200 kHz offset for less than 13 μ sec, or 80 dB rejection at 75 kHz offset at the expense of 32 μ sec delay.

RCC Consultants, Inc.

Transmittal #: 06100112
Project #: MF-100-511-1004-11
Name: lumpsum
Date: 6/25/15

- Approved
- Approved as noted
- Disapproved
- Hold
- Resubmit



Typical 32 usec Delay digital filter Amplitude vs Frequency

The MARK-IV DIGITAL has a rugged design for multi-carrier two-way rebroadcast systems, where significantly high dynamic range is required on a channel-per-channel basis, while delivering low propagation (group) delay.

Note - BDA Part # M4D-100-806-3R-K3



**Public Safety 800 MHz Analog and Digital P25, TETRA & TETRAPOL (and others)
MARK-IV DIGITAL NARROWBAND SIGNAL BOOSTER SPECIFICATIONS**

| Parameter | Specification (Typical) |
|---|--|
| Frequency range: Customs windows can be accommodated within the uplink/downlink sub-bands | 806-817 MHz / 851-862 MHz overall range The system bandwidth per path (UL & DL) may be specified as 3, 10 MHz |
| Contact Canam with your specific frequency plan | |
| Narrowband small-signal gain per filter window | 120 dB typ., 130 dB max. |
| Minimum Sensitivity | >110 dBm @ SINAD \geq 25 dB |
| (excluding external front-end filtering or padding) | -115 dBm @ SINAD \geq 18 dB |
| Analog-FM Modulation Distortion & Digital Modulations B.E.R. | \leq 3% at minimum sensitivity |
| Narrowband filters Selectivity - Adjacent Channel Rejection (ACR) | 20-80 dB, depending upon the digital filter mask (programmable) |
| Absolute Group Delay | 10-110 μ sec, depending upon the digital filter mask (programmable) |
| Sample data: 30 Di filter mask: | BW = 60 kHz @ -1dB passband typ. Selectivity \geq 80dB @ +/- 75 kHz Group delay \leq 32 usec (typ.) |
| Channel Bandwidth and Spacing accommodations | 6.25 kHz, 12.5 kHz, 25 kHz (100 Hz step) |
| Narrowband Automatic Gain Control (AGC) range on a per-filter window basis | 60 dB |
| (Two carriers strong/weak) | |
| Maximum input power (composite) for no-damage | >20 dBm (typ.), or subject to custom factory build option |
| Input (Rx) IM Rejection, per TIA standard | >60 dB |
| Narrowband Constant Output level regardless of input level variations, per filter | +/- 2 dB typ. |
| Broadband Input Automatic Level Control (IALC) range to prevent Rx/front-end undesired saturation | 0-30 dB, 1 dB digital step (automatic setting) |



| Parameter | Specification |
|--|---|
| Noise Figure (without custom external front-end filtering or padding) | 7 dB |
| Broadband output level adjustment range | 1-30 dB typ. 1dB digital step |
| Output MCPA IMD at +30 dBm per channel, with 10 channels transmitting (before filtering) | ≥ 60 dBc typ. |
| Output Multi-Carrier Automatic Level Control | ≥ +40 dBm (10Watt) |
| Spurious & harmonics outputs [per new FCC §90.219 Good Engineering Practices] | < -30 dBm (US Narrow); < -36 dBm (EU) |
| Input & Output RF ports | 50 Ohm, Type-N (female), 1.5:1 VSWR |
| • MAJOR SOFTWARE DEFINED FIELD-PROGRAMMABLE SETTINGS | |
| Narrowband Filters selectivity and bandwidth | (firmware system personally) |
| Filters center frequency (Fo) in 0.1 kHz steps | |
| Input (Rx) Threshold level, per individual narrowband window/filter ("GAS squelch") | |
| Output Power level, fine tune per filter or overall | |
| Receive Signal Strength Indicator level - RSSI, per window | |
| Number of filters per path (depending upon selected firmware mask) | 8, 10 or 20 |
| CTCSS PL Tone detection (programmable) | OPTIONAL |
| • OTHER | |
| 4RU or 6RU Rackmount enclosures (total rack space depends on custom filtering requirements per actual user frequency plan) | NEMA-1 |
| Wallmount enclosure (NEMA 12/4/4X) | Available upon request |
| Duty Cycle | 100 % |
| Operating ambient temperature range | -30 to +60° Celsius standard |
| MTBF | > 50,000 hours (BF only) > 40,000 h (fiber-fed) |
| Power requirements @ full load (actual power draw depends on actual system configuration) | 300 Watt max @ 100-240 Vac, 50/60 Hz 28 VDC input OPTIONAL |
| • RF-over-Fiber Link (optional) | |
| Frequency Range | 10 - 1000 MHz |
| Gain Flatness | ±1 dB |
| Input Third Order Intercept | +13dBm (UL) / +30dBm (DL) |
| Noise Figure [Noise Floor @ 10kHz BW] | 23dB [-110dBm] (UL) / 39dB [-93dBm] (DL) |
| Laser Type | DBF / 1310nm ± 20nm (CWDM available) |

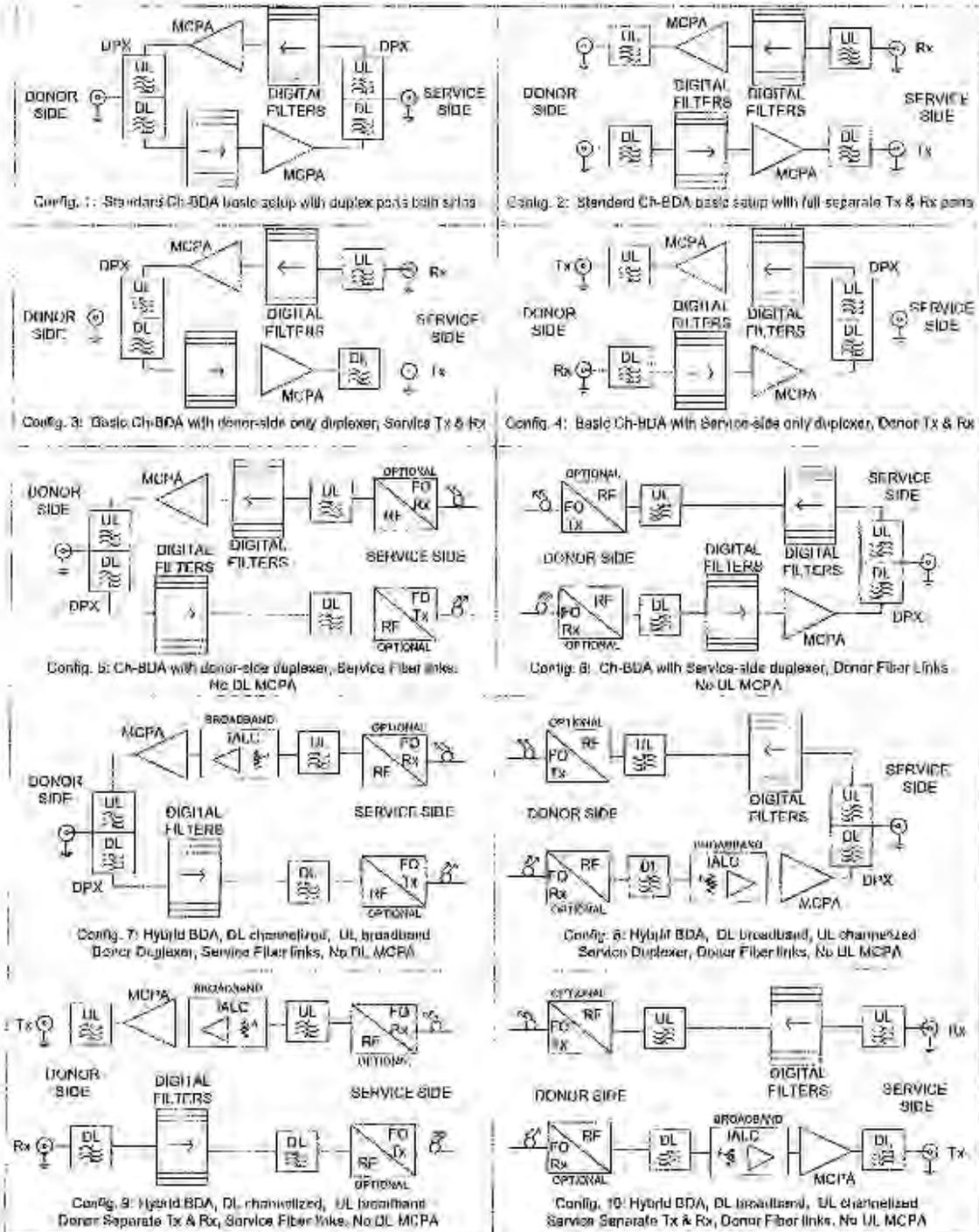
| | |
|--|---|
| Network remote control (Ethernet 10/100) | TCP/IP: web server, SNMP |
| PC Software | Any generic web-browser |
| Local Debug Port | Serial RS-232 over USB |
| Local Human-Machine-Interface | LCD display with 7-button keypad, plus LED Indicators |
| Factory-Programmable-function Discrete Digital I/O (Dry contact, voltage-free) | 4 Relay output dry-contacts 4 Opto-isolated inputs |
| Internal Sensors, overall system | Temperature, DC Voltage/Current, Locked-rotor cooling fan monitoring, Output RF Forward & Reverse, Input RF Composite Power (DL and UL) True-RMS RF Detectors/Limiters (In/Out) |
| <ul style="list-style-type: none"> • CUSTOM BUILD OPTIONS | |
| Duplexer/Multiplexer filters for common Tx/Rx antenna, or separate DL and UL paths (custom build) | |
| Low noise RF-over-Fiber-Optic transceiver | |
| Multi Carrier Power Amplifiers (MCPA) are optional per system requirements | |
| CTCSS Analog PL Tone Detection | |
| NFPA72-2010 compliant or Custom Input/Output status/monitoring functionality, for example: Open door, Low-Battery, AC Power Failure, Smoke detector, Strobe light or Siren indicator, etc. | |
| Frequency (shift) in-band translator | |

Part 90 Signal Boosters THIS IS A 90.219 CLASS A DEVICE

WARNING. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class A signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation."



MARK-IV DIGITAL Narrowband Signal Booster Configurations (Other configurations available upon request)

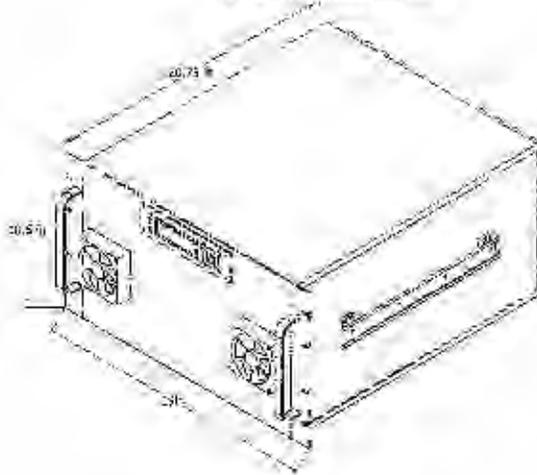


MARK-IV DIGITAL Narrowband Signal Booster Rackmount Enclosure

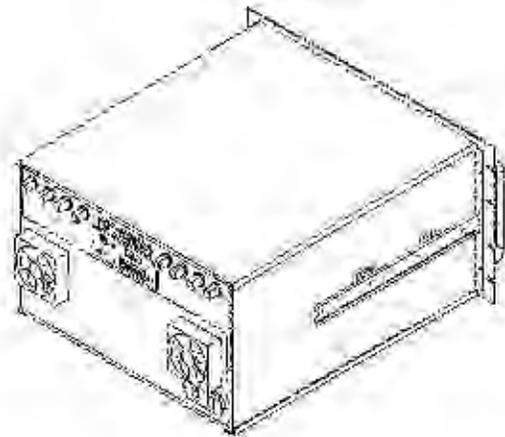


(Excluding filtering)

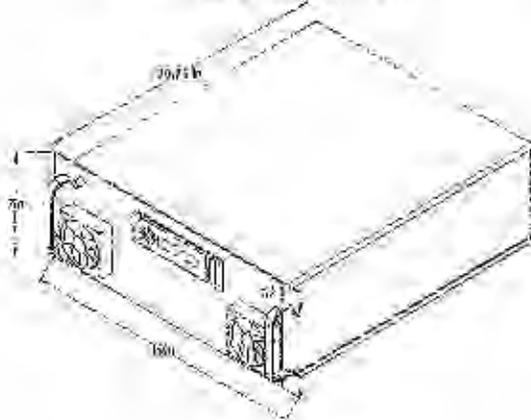
M4D 8RU CHASSIS
ISOMETRIC FRONT VIEW



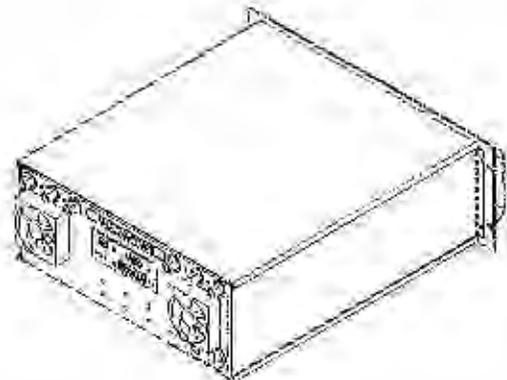
M4D 8RU CHASSIS
ISOMETRIC REAR VIEW



M4D 4RU CHASSIS
ISOMETRIC FRONT VIEW



M4D 4RU CHASSIS
ISOMETRIC REAR VIEW





| Ordering Information | |
|--|--|
| M4D - XC YYY - F B M - Kn -V | |
| XC: Number of Channels | M: Mounting |
| 8C: 8 channels | R: Rack Mount |
| 10C: 10 channels | D: Wall Box |
| 20C: 20 channels | |
| YYY: Starting Frequency | Kn: Configuration number |
| 806: 806 MHz | K1: Config 1, K2: Config 2, |
| 809: 809 MHz | Kn: Config n (1, 10) |
| F: Fiber Optics options | V: Power Input |
| F: Integrated Fiber Optical equipment | 28V: 28V DC powered unit |
| Leave blank: No fiber feature | Leave Blank: AC 85-260 Vac 47-63 Hz |
| B: Preslector/Duplexor Filter Bandwidth | Examples: |
| 3: 3MHz BW | M4D-10C806-3R-K1 :800 MHz Public Safety-only NPSAC (806-809/851-854 MHz), 3 MHz BW, 10-channels Rack mount, Configuration 1, AC power |
| 10: 10MHz BW | M4D-20C806-11B-K1 : Entire Public Safety band (806-817/851-862 MHz), 11 MHz BW, 20-channels wall mount, configuration 1, AC power |
| 11: 11MHz BW | |



THE PORT AUTHORITY OF NY & NJ

TRANSMITTAL

No. 00126

241 Erie Street
Jersey City, NJ 07310

Phone: 201-595-4751

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 7/14/2015

TO: Tishman Technologies
2 Gateway Center
17th Floor
Newark, NJ 07102

Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: Gary Dragona

| WE ARE SENDING: | STATUS LEGEND: | | SUBMITTED FOR: |
|--|-----------------------------------|---|---|
| <input type="checkbox"/> Shop Drawings | Approved (APP) | New Item (NEW) | <input type="checkbox"/> Approval |
| <input type="checkbox"/> Letter | Approved as Corrected (AAC) | Not Approved (NA) | <input type="checkbox"/> Your Use |
| <input type="checkbox"/> Prints | Approved as Noted (AAN) | Not Reviewed (NR) | <input type="checkbox"/> As Requested |
| <input type="checkbox"/> Change Order | For Record Only (PRO) | Review With Comments (RWC) | <input type="checkbox"/> Review and Comment |
| <input type="checkbox"/> Plans | For Your Information (FYI) | Review With No Comments (RWNC) | |
| <input type="checkbox"/> Samples | Incomplete (INC) | Superseded (SUPS) | |
| <input type="checkbox"/> Specifications | SENT VIA: | | DUE DATE: |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Attached | <input type="checkbox"/> Separate Cover Via: File Interoffice | |

| PACKAGE | SUBMITTAL | DWG. # | REV. | COPIES | DATE | DESCRIPTION | STATUS |
|---------|-----------|--------|------|--------|-----------|------------------------------------|--------|
| 16785 | 16785-053 | | R000 | 4 | 7/14/2015 | (BSU) Canam Base Station Unit | AAN |
| 16785 | 16785-054 | | R000 | 4 | 7/14/2015 | (RRU) Canam Remote Repeater Unit | AAN |
| 16785 | 16785-055 | | R000 | 4 | 7/14/2015 | (FTU) Canam Fiber Transceiver Unit | AAN |

() Please make necessary corrections as noted, if any. Place approval form on original of each approved drawing or cut, insert date of approval within same and return _____ prints each. IT IS REQUESTED THAT THESE PRINTS BE RETURNED TO US WITHIN 5 DAYS.

() CLEAR TRANSPARENCY REQUIRED

The Contract required that the Contractor shall furnish to the engineer one set of drawings, all clearly revised, completed and brought up-to-date showing all of the permanent equipment, materials and construction as actually used.

Your earliest attention to these items would be greatly appreciated so as to avoid delay in the progress of the job.

Very Truly Yours,

Signed:

Edward Chang

CC: Transmittal Only: E. Chang

One Copy: Doc. Control / Two Copies: A. Kaprielian



PROJECT: HT IN-BUILDING

DATE: 7/8/2015

TO: Port Authority of NY & NJ
241 Erie Street
PANYNJV02881
Jersey City, NJ 07310

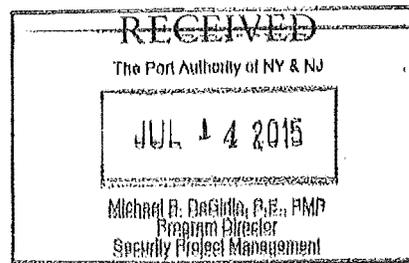
REF: MF-100.511 WO#21
HT-In-Building

ATTN: Amalia Fowler

| WE ARE SENDING: | SUBMITTED FOR: | ACTION TAKEN: |
|---|--|---|
| <input type="checkbox"/> Shop Drawings | <input type="checkbox"/> Approval | <input type="checkbox"/> Approved as Submitted |
| <input type="checkbox"/> Letter | <input checked="" type="checkbox"/> Your Use | <input checked="" type="checkbox"/> Approved as Noted |
| <input type="checkbox"/> Prints | <input checked="" type="checkbox"/> As Requested | <input type="checkbox"/> Returned After Loan |
| <input type="checkbox"/> Change Order | <input type="checkbox"/> Review and Comment | <input type="checkbox"/> Resubmit |
| <input type="checkbox"/> Plans | | <input type="checkbox"/> Submit |
| <input type="checkbox"/> Samples | SENT VIA: | <input type="checkbox"/> Returned |
| <input type="checkbox"/> Specifications | <input checked="" type="checkbox"/> Attached | <input type="checkbox"/> Returned for Corrections |
| <input checked="" type="checkbox"/> Other: Catalog Cut Sheets | <input type="checkbox"/> Separate Cover Via: | <input type="checkbox"/> Due Date: |

| ITEM | PACKAGE | SUBMITTAL | DRAWING | REV. | ITEM NO. | COPIES | DATE | DESCRIPTION | STATUS |
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| | 16785 | 16785-053 | | 0 | 1 | 7 | 7/9/2015 | (BSU) Canam Base Station Unit | AAN |
| | 16785 | 16785-054 | | 0 | 2 | 7 | 7/9/2015 | (RRU) Canam Remote Repeater Unit | AAN |
| | 16785 | 16785-055 | | 0 | 3 | 7 | 7/9/2015 | (FTU) Canam Fiber Transceiver Unit | AAN |

- Remarks:**
1. Submittal 16785-053 rev0 Approved As Noted and per attached email
 2. Submittal 16785-054 rev0 Approved As Noted and per attached email
 3. Submittal 16785-055 rev0 Approved As Noted and per attached email
 4. Due to Submittal 16785-052 rev0, 16785-053 rev0, 16785-054 rev0, and 16785-055 rev0, the following shall be revised and resubmitted to include new equipment
 - A. Test Plans
 - A.1. Factory Acceptance Test Plan
 - A.2. Pre-Installation Test Plan
 - A.3. Site Acceptance Test Plan
 - B. Shop Drawings
 - B.1. Detailed Interconnection Diagram
 - B.2. Equipment Rack Layout
 - B.3. Equipment Riser



CC:

Signed: *Beng Connell*
Beng Connell



THE PORT AUTHORITY OF NY & NJ

TRANSMITTAL

No. 00119

241 Eric Street
Jersey City, NJ 07310

Phone: 201-595-4751

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 6/24/2015

TO: RCC Consultants, Inc.
100 Woodbridge Center Dr. Suite 201
Woodbridge, NJ 07095

Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: Beng Connell

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| 16785 | 16785-053 | | R000 | 4 | 6/24/2015 | (BSU) Canam Base Station Unit | NEW |
| 16785 | 16785-054 | | R000 | 4 | 6/24/2015 | (RRU) Canam Remote Repeater Unit | NEW |
| 16785 | 16785-055 | | R000 | 4 | 6/24/2015 | (FTU) Canam Fiber Transceiver Unit | NEW |

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() CLEAR TRANSPARENCY REQUIRED

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TO: TTC

at, insert date of approval and brought

Your earliest attention to these items would be greatly appreciated so as to avoid delay in the progress of the job.

Very Truly Yours,

Signed:

Edward Chang

CC: Transmittal Only: E. Chang / A. Kaprielian
One Copy: Doc. Control

Tishman Technologies Corporation

TRANSMITTAL

2 Gateway Center
17th Floor
Newark, NJ 07102

Phone: 973.622.5600

No. 00114

PROJECT: WO#21 Holland Tunnel-800 MHz In-Bldg

DATE: 6/23/2015

TO: Port Authority of NY & NJ
241 Erie Street
Room 222
Jersey City, NJ 07310

REF: Contract No. MF-100.511

ATTN: Amalia Fowler

| WE ARE SENDING: | SUBMITTED FOR: | ACTION TAKEN: |
|--|--|---|
| <input type="checkbox"/> Shop Drawings | <input type="checkbox"/> Approval | <input type="checkbox"/> Approved as Submitted |
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| <input type="checkbox"/> Samples | SENT VIA: | <input type="checkbox"/> Returned |
| <input type="checkbox"/> Specifications | <input checked="" type="checkbox"/> Attached | <input type="checkbox"/> Returned for Corrections |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Separate Cover Via: PA Interoffice Mail | <input type="checkbox"/> Due Date: |

| ITEM | PACKAGE | SUBMITTAL | DRAWING | REV. | ITEM NO. | COPIES | DATE | DESCRIPTION | STATUS |
|------|---------|-----------|---------|------|----------|--------|-----------|------------------------------------|--------|
| SUT | 16785 | 16785-053 | | Rev0 | 1 | 9 | 6/23/2015 | (BSU) Canam Base Station Unit | NEW |
| SUT | 16785 | 16785-054 | | Rev0 | 2 | 9 | 6/23/2015 | (RRU) Canam Remote Repeater Unit | NEW |
| SUT | 16785 | 16785-055 | | Rev0 | 3 | 9 | 6/23/2015 | (FTU) Canam Fiber Transceiver Unit | NEW |

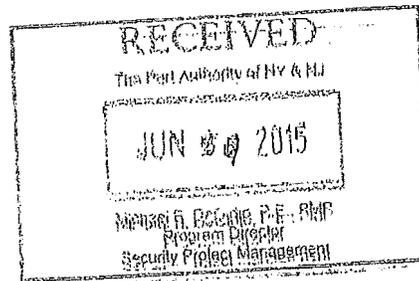
Remarks: Please Note:

Item #1 - Submittal No. 16785-053 Rev0 is being submitted for approval and issued as superseding Submittal No. 16785-018 Rev0 (BSU - Fiber-Span Base Station Interface) that is no longer applicable.

Item #2 - Submittal No. 16785-054 Rev0 is being submitted for approval and issued as superseding Submittal No. 16785-020 Rev0 (RRU - Fiber-Span Remote Repeater Unit) that is no longer applicable.

Item #3 - Submittal No. 16785-055 Rev0 is being submitted for approval and issued as superseding Submittal No. 16785-026 Rev0 (FTU - Fiber-Span Transceiver Unit) that is no longer applicable.

These submittal items are being place in Live Link and are not Confidential in nature. Nine (9) copies of each submittal are being sent to the PA-Document group, attention, Amalia Fowler.



CC: Trans Only – G. Dragona, J. Lee
Copy Only - Job File

Signed: William Cendales
William Cendales



THE PORT AUTHORITY OF NY & NJ

TRANSMITTAL

No. 00126

241 Erie Street
Jersey City, NJ 07310

Phone: 201-595-4751

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 7/14/2015

TO: Tishman Technologies
2 Gateway Center
17th Floor
Newark, NJ 07102

Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: Gary Dragona

| WE ARE SENDING: | STATUS LEGEND: | | SUBMITTED FOR: |
|--|---|--------------------------------|---|
| <input type="checkbox"/> Shop Drawings | Approved (APP) | New Item (NEW) | <input type="checkbox"/> Approval |
| <input type="checkbox"/> Letter | Approved as Corrected (AAC) | Not Approved (NA) | <input type="checkbox"/> Your Use |
| <input type="checkbox"/> Prints | Approved as Noted (AAN) | Not Reviewed (NR) | <input type="checkbox"/> As Requested |
| <input type="checkbox"/> Change Order | For Record Only (FRO) | Review With Comments (RWC) | <input type="checkbox"/> Review and Comment |
| <input type="checkbox"/> Plans | For Your Information (FYI) | Review With No Comments (RWNC) | |
| <input type="checkbox"/> Samples | Incomplete (INC) | Superseded (SUPS) | |
| <input type="checkbox"/> Specifications | SENT VIA: | | DUE DATE: |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Attached <input type="checkbox"/> Separate Cover Via: File Interoffice | | |

| PACKAGE | SUBMITTAL | DWG. # | REV. | COPIES | DATE | DESCRIPTION | STATUS |
|---------|-----------|--------|------|--------|-----------|------------------------------------|--------|
| 16785 | 16785-053 | | R000 | 4 | 7/14/2015 | (BSU) Canam Base Station Unit | AAN |
| 16785 | 16785-054 | | R000 | 4 | 7/14/2015 | (RRU) Canam Remote Repeater Unit | AAN |
| 16785 | 16785-055 | | R000 | 4 | 7/14/2015 | (FTU) Canam Fiber Transceiver Unit | AAN |

() Please make necessary corrections as noted, if any. Place approval form on original of each approved drawing or cut, insert date of approval within same and return _____ prints each. IT IS REQUESTED THAT THESE PRINTS BE RETURNED TO US WITHIN 5 DAYS.

() CLEAR TRANSPARENCY REQUIRED

The Contract required that the Contractor shall furnish to the engineer one set of drawings, all clearly revised, completed and brought up-to-date showing all of the permanent equipment, materials and construction as actually used.

Your earliest attention to these items would be greatly appreciated so as to avoid delay in the progress of the job.

Very Truly Yours,

Signed: _____

Edward Chang

CC: Transmittal Only: E. Chang

One Copy: Doc. Control / Two Copies: A. Kaprielian

RCC Consultants, Inc.

100 Woodbridge Center Drive
Ste 201
Woodbridge, NJ 07095



Phone: (732) 404-2481
Fax: (732) 404-2580

TRANSMITTAL

No. 00049

PROJECT: HT IN-BUILDING

DATE: 7/8/2015

TO: Port Authority of NY & NJ
241 Erie Street
PANYNJV02881
Jersey City, NJ 07310

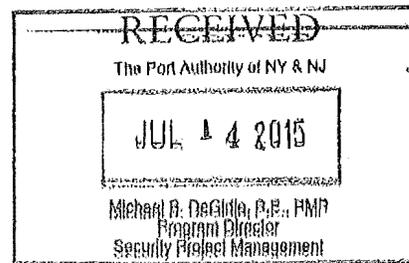
REF: MF-100.511 WO#21
HT-In-Building

ATTN: Amalia Fowler

| WE ARE SENDING: | SUBMITTED FOR: | ACTION TAKEN: |
|---|--|---|
| <input type="checkbox"/> Shop Drawings | <input type="checkbox"/> Approval | <input type="checkbox"/> Approved as Submitted |
| <input type="checkbox"/> Letter | <input checked="" type="checkbox"/> Your Use | <input checked="" type="checkbox"/> Approved as Noted |
| <input type="checkbox"/> Prints | <input checked="" type="checkbox"/> As Requested | <input type="checkbox"/> Returned After Loan |
| <input type="checkbox"/> Change Order | <input type="checkbox"/> Review and Comment | <input type="checkbox"/> Resubmit |
| <input type="checkbox"/> Plans | | <input type="checkbox"/> Submit |
| <input type="checkbox"/> Samples | SENT VIA: | <input type="checkbox"/> Returned |
| <input type="checkbox"/> Specifications | <input checked="" type="checkbox"/> Attached | <input type="checkbox"/> Returned for Corrections |
| <input checked="" type="checkbox"/> Other: Catalog Cut Sheets | <input type="checkbox"/> Separate Cover Via: | <input type="checkbox"/> Due Date: |

| ITEM | PACKAGE | SUBMITTAL | DRAWING | REV. | ITEM NO. | COPIES | DATE | DESCRIPTION | STATUS |
|------|---------|-----------|---------|------|----------|--------|----------|------------------------------------|--------|
| | 16785 | 16785-053 | | 0 | 1 | 7 | 7/9/2015 | (BSU) Canam Base Station Unit | AAN |
| | 16785 | 16785-054 | | 0 | 2 | 7 | 7/9/2015 | (RRU) Canam Remote Repeater Unit | AAN |
| | 16785 | 16785-055 | | 0 | 3 | 7 | 7/9/2015 | (FTU) Canam Fiber Transceiver Unit | AAN |

- Remarks:**
1. Submittal 16785-053 rev0 Approved As Noted and per attached email
 2. Submittal 16785-054 rev0 Approved As Noted and per attached email
 3. Submittal 16785-055 rev0 Approved As Noted and per attached email
 4. Due to Submittal 16785-052 rev0, 16785-053 rev0, 16785-054 rev0, and 16785-055 rev0, the following shall be revised and resubmitted to include new equipment
 - A. Test Plans
 - A.1. Factory Acceptance Test Plan
 - A.2. Pre-Installation Test Plan
 - A.3. Site Acceptance Test Plan
 - B. Shop Drawings
 - B.1. Detailed Interconnection Diagram
 - B.2. Equipment Rack Layout
 - B.3. Equipment Riser



CC:

Signed: Beng Connell
Beng Connell



THE PORT AUTHORITY OF NY & NJ

TRANSMITTAL

No. 00119

241 Erie Street
Jersey City, NJ 07310

Phone: 201-595-4751

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 6/24/2015

TO: RCC Consultants, Inc.
100 Woodbridge Center Dr. Suite 201
Woodbridge, NJ 07095

Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: Beng Connell

| WE ARE SENDING: | STATUS LEGEND: | | SUBMITTED FOR: |
|--|-----------------------------------|--|---|
| <input type="checkbox"/> Shop Drawings | Approved (APP) | New Item (NEW) | <input type="checkbox"/> Approval |
| <input type="checkbox"/> Letter | Approved as Corrected (AAC) | Not Approved (NA) | <input type="checkbox"/> Your Use |
| <input type="checkbox"/> Prints | Approved as Noted (AAN) | Not Reviewed (NR) | <input type="checkbox"/> As Requested |
| <input type="checkbox"/> Change Order | For Record Only (FRO) | Review With Comments (RWC) | <input type="checkbox"/> Review and Comment |
| <input type="checkbox"/> Plans | For Your Information (FYI) | Review With No Comments (RWNC) | |
| <input type="checkbox"/> Samples | Incomplete (INC) | Superseded (SUPS) | |
| <input type="checkbox"/> Specifications | SENT VIA: | | DUE DATE: |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Attached | <input type="checkbox"/> Separate Cover Via: | |

| PACKAGE | SUBMITTAL | DWG. # | REV. | COPIES | DATE | DESCRIPTION | STATUS |
|---------|-----------|--------|------|--------|-----------|------------------------------------|--------|
| 16785 | 16785-053 | | R000 | 3 | 6/24/2015 | (BSU) Canam Base Station Unit | NEW |
| 16785 | 16785-054 | | R000 | 3 | 6/24/2015 | (RRU) Canam Remote Repeater Unit | NEW |
| 16785 | 16785-055 | | R000 | 3 | 6/24/2015 | (FTU) Canam Fiber Transceiver Unit | NEW |

() Please make necessary corrections as noted, if any. Place approval form on each approval within same and return _____ prints each. IT IS REQUESTED THAT YOU RETURN WITHIN 5 DAYS.

() CLEAR TRANSPARENCY REQUIRED

The Contract required that the Contractor shall furnish to the engineer one set of up-to-date showing all of the permanent equipment, materials and construction drawings.

TO: TTC

but, insert date of SUBMITTAL TO US WITHIN 5

and brought

Your earliest attention to these items would be greatly appreciated so as to avoid delay in the progress of the job.

Very Truly Yours,

Signed:

Edward Chang

CC: Transmittal Only: E. Chang / A. Kaprielian
One Copy: Doc. Control

Tishman Technologies Corporation

2 Gateway Center
17th Floor
Newark, NJ 07102

Phone: 973.622.5600

TRANSMITTAL

No. 00114

PROJECT: WO#21 Holland Tunnel-800 MHz In-Bldg

DATE: 6/23/2015

TO: Port Authority of NY & NJ
241 Erie Street
Room 222
Jersey City, NJ 07310

REF: Contract No. MF-100.511

ATTN: Amalia Fowler

| WE ARE SENDING: | SUBMITTED FOR: | ACTION TAKEN: |
|--|--|---|
| <input type="checkbox"/> Shop Drawings | <input type="checkbox"/> Approval | <input type="checkbox"/> Approved as Submitted |
| <input type="checkbox"/> Letter | <input type="checkbox"/> Your Use | <input type="checkbox"/> Approved as Noted |
| <input type="checkbox"/> Prints | <input type="checkbox"/> As Requested | <input type="checkbox"/> Returned After Loan |
| <input type="checkbox"/> Change Order | <input type="checkbox"/> Review and Comment | <input type="checkbox"/> Resubmit |
| <input type="checkbox"/> Plans | | <input type="checkbox"/> Submit |
| <input type="checkbox"/> Samples | SENT VIA: | <input type="checkbox"/> Returned |
| <input type="checkbox"/> Specifications | <input checked="" type="checkbox"/> Attached | <input type="checkbox"/> Returned for Corrections |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Separate Cover Via: PA Interoffice Mail | <input type="checkbox"/> Due Date: |

| ITEM | PACKAGE | SUBMITTAL | DRAWING | REV. | ITEM NO. | COPIES | DATE | DESCRIPTION | STATUS |
|------|---------|-----------|---------|------|----------|--------|-----------|------------------------------------|--------|
| SUT | 16785 | 16785-053 | | Rev0 | 1 | 9 | 6/23/2015 | (BSU) Canam Base Station Unit | NEW |
| SUT | 16785 | 16785-054 | | Rev0 | 2 | 9 | 6/23/2015 | (RRU) Canam Remote Repeater Unit | NEW |
| SUT | 16785 | 16785-055 | | Rev0 | 3 | 9 | 6/23/2015 | (FTU) Canam Fiber Transceiver Unit | NEW |

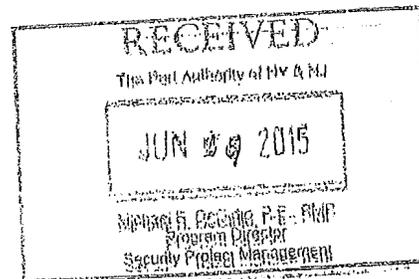
Remarks: Please Note:

Item #1 - Submittal No. 16785-053 Rev0 is being submitted for approval and issued as superseding Submittal No. 16785-018 Rev0 (BSU - Fiber-Span Base Station Interface) that is no longer applicable.

Item #2 - Submittal No. 16785-054 Rev0 is being submitted for approval and issued as superseding Submittal No. 16785-020 Rev0 (RRU - Fiber-Span Remote Repeater Unit) that is no longer applicable.

Item #3 - Submittal No. 16785-055 Rev0 is being submitted for approval and issued as superseding Submittal No. 16785-026 Rev0 (FTU - Fiber-Span Transceiver Unit) that is no longer applicable.

These submittal items are being place in Live Link and are not Confidential in nature. Nine (9) copies of each submittal are being sent to the PA-Document group, attention, Amalia Fowler.



CC: Trans Only – G. Dragona, J. Lee
Copy Only - Job File

Signed: William Cendales
William Cendales

RCC COMMENTS ON SUBMITTAL 16785-053Rev0/054Rev0/055Rev0

A. Submittal 16785-053 Rev0 Canam Base Station Unit

Submittal 16785-055 Rev0 Canam Fiber Transceiver Unit

Resubmit

C-Spec requires Fiber Optic Transceiver and Interface to be capable of supporting up to 4 remote units. The equipment part numbers submitted will only support 2 remote units.

Contractor can resubmit revised Part Numbers Only.

B. Submittal 16785-054 Rev0 Canam Remote Repeater Unit

Approve as Noted

Notes:

1. Contractor to verify and confirm availability of space for new rack/cabinet or existing equipment rack(s) at SG1 and SG2 with unused space to install the rack mounted remote repeater.
2. Contractor to submit new equipment rack location for approval.

General Notes (For Submittals 16785-052Rev0/053Rev0/054Rev0/055Rev0):

As result of this change, the following shall be revised and resubmitted to include new equipment:

A. Test plans

1. Factory Acceptance Test Plan
2. Pre-Installation test Plan
3. Site Acceptance test Plan

B. Shop drawings:

1. Detailed Interconnection diagram
2. Equipment Rack Layout
3. Equipment Riser

Fowler, Amalia

From: Asuncion Connell [aconnell@rcc.com]
Sent: Thursday, July 02, 2015 10:13 AM
To: Chang, Edward; Fowler, Amalia
Subject: RE: PA MF-100.511, WO#21, Holland Tunnel - 800 Mhz In-Building RF Coverage Expansion Enhancement, Submittal No. 16785-056 Rev 0, (Hoffman - Canam Remote Repeater Unit Enclosure)
Attachments: Submittal 16785-053Rev0_054Rev0_055Rev0_RCC Comments.pdf

Hi Ed, please see attached RCC comments on FO Equipment Submittal. This file is also on livelink in the folder below. - beng

 Project Website Home

 Security Capital Program

 Projects

 TB&T

 HT

 11552000 - WO21 HT 800 MHz In-Building RF Coverage Improvema...

 DESIGN CONTENT

 Document Exchange

 Stage IV

 [Submittal 16785-053Rev0_054Rev0_055Rev0_RCC Comments.pdf](#)

From: Chang, Edward [mailto:echang@panynj.gov]

Sent: Wednesday, July 01, 2015 11:21 AM

To: Asuncion Connell; Fowler, Amalia

Subject: FW: PA MF-100.511, WO#21, Holland Tunnel - 800 Mhz In-Building RF Coverage Expansion Enhancement, Submittal No. 16785-056 Rev 0, (Hoffman - Canam Remote Repeater Unit Enclosure)

Beng, for your expedited review.

Amalia, please prepare transmittal.

Thanks.

From: Lee, Joong [mailto:Joong.Lee@aecom.com]

Sent: Wednesday, July 01, 2015 11:14 AM

To: Chang, Edward

Cc: Lynch, Maureen; Tresser, Tatiana; Campbell, Wesley; Madigan, Michael; Fowler, Amalia; Dragona, Gary; Cendales, William; Revankar, Vijay; Martin, Calixto; dfernandez@panynj.gov

Subject: PA MF-100.511, WO#21, Holland Tunnel - 800 Mhz In-Building RF Coverage Expansion Enhancement, Submittal No. 16785-056 Rev 0, (Hoffman - Canam Remote Repeater Unit Enclosure)

Ed,

As listed below, please see the Live Link path for the aforementioned submittal, which is being issued for approval:

 [Project Website Home](#)

 [Security Capital Program](#)

 [Projects](#)

 [TB&T](#)

 [HT](#)

 [11552000 - WO21 HT 800 MHz In-Building RF Coverage Improveme...](#)

 [DESIGN CONTENT](#)

 [WO21 Stage IV contractor](#)

 [Submittal](#)

 [Submittal 16785-056 Rev 0](#)

Transmittal/Submittal Package

PA WO#21 MF-100.511, TTC Trans No. 00117

PA WO#21, MF-100.511, Submittal No. 16785-056 Rev 0

Please note, nine (9) sets of this submittal is being sent to Amalia's attention for her use and distribution.

Any questions please call Gary Dragona at 646-786-6565 Ext 6574.

Thanks,

Joshua Lee

Asslstant Project Manager/ Tishman Technologies Corp.

joong.lee@aecom.com

Tishman Technologies Corp.

An AECOM Company

11 Broadway, Suite 855

New York, NY 10004

Phone: (646)786-6565

Direct: (646)786-6572

Cell: (646)351-9509

Fax: (646)922-7874

www.tishmanconstruction.com

See Tishman's confidentiality policy at

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NOTICE: THIS E-MAIL AND ANY ATTACHMENTS CONTAIN INFORMATION FROM THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY AND AFFILIATES. IF YOU BELIEVE YOU HAVE RECEIVED THIS E-MAIL IN ERROR, PLEASE NOTIFY THE SENDER IMMEDIATELY, PERMANENTLY DELETE THIS E-MAIL (ALONG WITH ANY ATTACHMENTS), AND DESTROY ANY PRINTOUTS.



23 JUL 01 2015

BASE STATION UNIT For Mark IV Bi-Directional Amplifiers

BY: RCC Consultants, Inc.

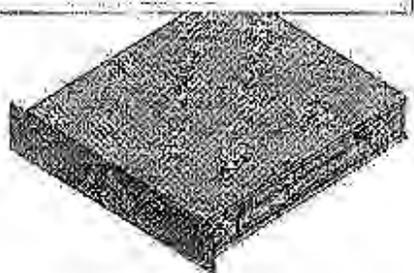
Model: M4-BSU-options

M4-BSU-24-10,
Basestation passive-interface unit to feed two RF/
Fiber links, rackmount.

The CYI MARK-IV BASE STATION UNIT, Integrates two sets of independent combining/splitting paths with adjustable attenuation.

Specified for a wide frequency range and minimum insertion loss, the M4-BSU is suitable to interface Head End equipment with multiple Remote Repeater Units.

The M4-BSU is available on dual or single configuration to support duplexed and non-duplexed systems, covering FM, VHF, UHF, LMR 700 & 800 MHz bands with 2, 4, 6, 8-port options. Each Path includes independent attenuation control, with several configurations available as well (Please refer to details and ordering information).



The M4-BSU is suitable to interface Fiber Transceiver Units at the Head End, as shown in the diagram below.

RCC Consultants, Inc.

Transmittal #: 00049

Project #: MF-100.5U W00 #2

Name: *[Signature]*

Date: 7/1/2015

Approved

Approved as noted

Disapproved

Hold

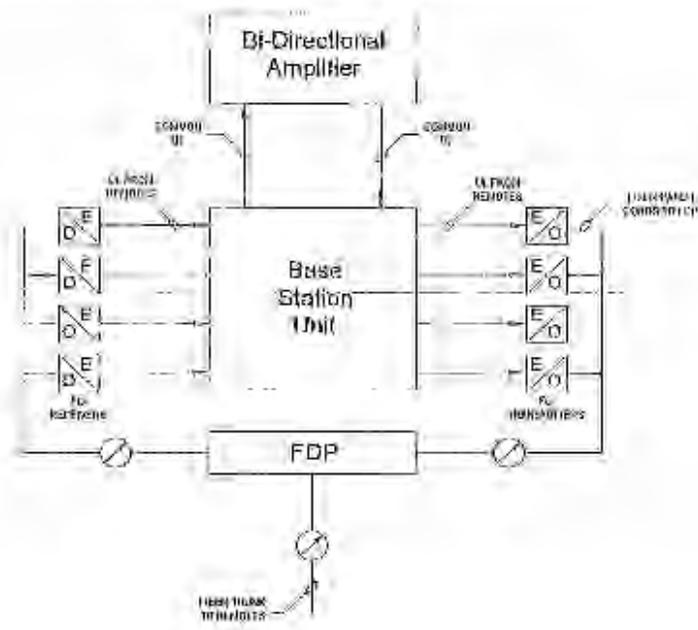
Resubmit

- Features & Applications:**
- Dual interface to support uplink and downlink.
 - Independent attenuation control.
 - Low insertion loss.
 - Up to 8 remotes connections.
 - Wideband frequency range.
 - Duplexer version available.

Note: M4-BSU-24-10 set up for 2 paths (UL + DL) with 4 ports per path

RECEIVED
JUN 23 2015
TISHMAN TECHNOLOGIES CORP.

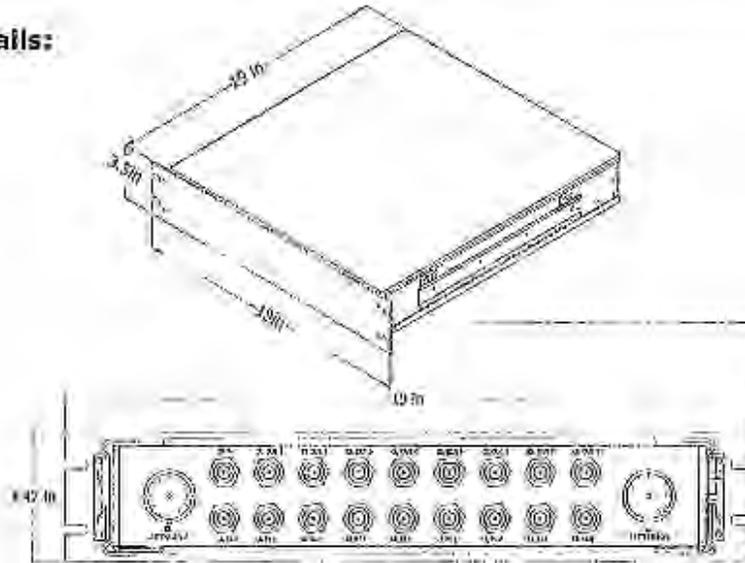
WO#21, TTC-100.511- 126land Tunnel-800 MHz In-Bldg Coverage
Submission 16785-053 REV0
(BSU) Canam Base Station Unit



| Parameter | Specification |
|---|--|
| ELECTRICAL | |
| Frequency Range | 10 - 1000 MHz |
| Attenuation (Additional to power and insertion loss) | 10dB @ 1dB step 30dB @ 3dB step 60dB @ 10dB step |
| Insertion Loss (typ) (Additional to power loss) | 2-port: 0.8dB 4-port: 1.2dB 6-port: 1.8dB 8-port: 2.1dB |
| Power Handling | 1 Watt |
| Input/Output VSWR | 1.4:1 |
| Impedance | 50 Ω |
| ENVIRONMENTAL | |
| Operating Temperature | -20° to +75° C |
| MECHANICAL | |
| Enclosure | 2U NEMA 1 standard 19" Rack Mount |
| Connectors | N-Female |
| Dimensions | 3.5" H x 19" W x 19"D |



Mechanical details:



Ordering Information

M4-BSU-XY-AA-FFF

X: Paths

- 1: Single Path
- 2: Dual Path
- 3: Duplexed

Y: Number of ports (up to 8 per path)

AA: Attenuation

- 10: 10dB @ 1dB step
- 30: 30dB @ 3dB step
- 60: 60dB @ 10dB step

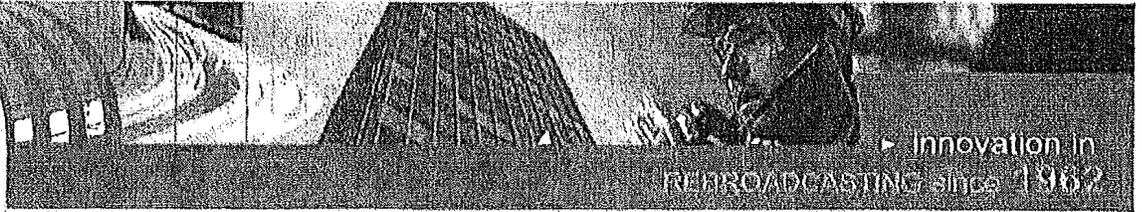
FFF: Frequency Filtering

- VHF: 150 - 174 MHz
- UHF: 450 - 490 MHz
- 800: 806-816 UL / 811 - 861 DL MHz
- 700: 799 - 805 UL / 769 - 775 DL MHz
- Leave Blank: Wide Band 10 to 1000MHz

Examples:

M4-BSU-24-10: Mark IV Base Station Unit, set up for 2 paths (UL and DL), 4 ports, 10dB @ 1dB step attenuation, wide-band (no filtering) 10 to 1000MHz range.

2 paths with 4 ports per path



Innovation in
REBROADCASTING since 1962

RCC Consultants, Inc.

Transmittal #: 00049

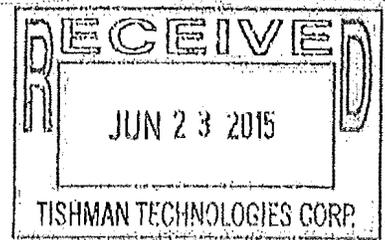
Project #: MF-100.511 WO#21

Name: *Wingemmel*

Date: 7/9/2015

- Approved
- Approved as noted
- Disapproved
- Hold Model: M4BBDAB-options
- Resubmit

**MARK-IV 800 MHz Broadband
(band-selective)
Bi-Directional Amplifier
for Public Safety applications**



M4-8N060351F4-RM,
Remote Fiber-fed Repeater (RRU), with Linear
High-Power Amplifier on the DL service duplexed
side, low-noise iALC Uplink, rackmount

DESCRIPTION:

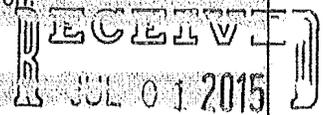
Canam's Broadband Bi-Directional Amplifiers are Class-B Signal Boosters per FCC 90.7 definition. They are designed to boost trunking or conventional two-way radio signals in order to extend the radio coverage in shadowed/enclosed areas. Exceptional performance, long term reliability, and high efficiency are achieved by employing advanced matching networks and combining techniques, EMI/RFI filters, machined housings, and qualified components.

Note: RRU to be installed inside wall-mounted cabinet WO#21, TTC-100.511 - Holland Tunnel-800 Mhz In-Bldg Coverage
in the location shown on contract drawings

Submittal 16785-054 REV0
(RRU) Canam Remote Repeater Unit

Features:

- Signal Booster with Bi-Directional Design, separate or duplexed band-selective RF paths for Downlink and Uplink bands.
- UL 806-824 MHz / DL 851-869 MHz and other sub-bands available upon request
- Suitable for analog or digital modulations.
- Multi-Carrier Power Amplifier (MCPA) modules with very-high OIP3 >= +56 dBm (60 dBm typical) and built-in output isolator for infinite mismatch open load protection.
- Non-Intrusive (tap) RF test ports
- Built-In Forward and Reverse RF power detector monitors.
- Wall-mount, NEMA-12 (NEMA 4X on request).
- Rack mount enclosure (4RU) with forced ventilation.
- Universal-Input Auto-sensing AC/DC power supplies with EMI filtering.
- Fail-safe alarms (Form C dry-contact relays) for remote monitoring.
- Automatic Level Control (ALC) in both the Uplink and Downlink paths. Protect the FO input in the Uplink path and compensate for power level variations in the downlink path due to changes in the optical link.
- Non-spurious ALC circuits can operate in the OLC range all-the-time.



BY: *RCC Consultants, Inc.*



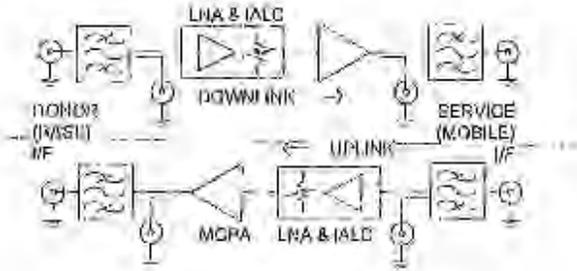
| Parameter | Specification |
|--|---|
| ELECTRICAL | |
| Operating Frequency Bands | UL 806-824 MHz, DL 851-869 MHz Other sub-bands on request UL 806-816 MHz, DL 851-861 MHz |
| High Output Power 1dB Compression (P1dB CW) | ≥ +47dB, 50W |
| IMD (Intermodulation products, 8 carriers @ +25dBm) | > -60 dBC |
| Maximum Recommended Operating Power Levels (10dB back-off margin shall be considered) | 2 carrier: +37 dBm each 4 carrier: +34 dBm each 8 carrier: +28 dBm each 16 carrier: +25 dBm each |
| Downlink Maximum Small Signal Gain | 55 dB typ. (60 dB max) |
| Downlink maximum input level for normal operation | -20 dBm |
| Uplink Maximum Operating Output Power Setting | -20 dBm (to feed fiber transmitter) |
| Uplink Maximum Gain (net) | 50 dB typ. (60dB max) |
| Uplink Maximum Input level for normal operation | -20 dBm |
| Uplink Noise Figure (for low level signal outside of ALC range) | 6 dB |
| Downlink and Uplink RF Input Limit Control (ILC) range | |
| Activation of the ILC does not create inter-modulation products or spurious outputs with levels greater than -60 dBC over the entire range of operation of the ILC, for any frequency spacing including down to 25 kHz. It prevents internal saturation of the amplifier stages. | > 25 dB (30 dB typ) |
| Gain Control range (UL & DL) | >25 dB, 1dB digital step |
| System RF Input/Output Impedance (UL & DL) | 50 Ohm, coaxial Type-N; VSWR 1.5:1 typ. |

| Parameter | Specification |
|--|---|
| MECHANICAL & ENVIRONMENTAL | |
| Enclosure | Wall-mount: stainless-steel NEMA-4X; 30"x24"x12" Rack Mount: 4U height typ; 7"(H) x 19"(W) x 22"(D) |
| RF Connectors Input/Output | N-Female |
| Weight | 65 lbs. (30 Kg) |
| Operating ambient temperature range | 0 to +60° Celsius, 100% duty cycle |
| MTBF | > 100,000 hours > 70,000 hours (fiber-fed versions) |
| Power Requirements (Actual power requirements depends on configuration) | 100-240 VAC/50/60Hz 28VDC (upon request) 200 Watt (typ) |
| Heat load | 650 BTU/hour |
| Cooling | Natural Convection (wallmount) Forced ventilation (rackmount) |
| INTERFACE AND ALARMS | |
| Human-Machine-Interface | LCD display with 7-button keypad LED Indicators |
| Computer Interface | 10/100 Ethernet RJ-45 Embedded Web-server and SNMPv2 support over TCP/IP network |
| Serial Port | RS-232 (factory debug) |
| Factory Programmable Function Discrete Digital I/O (Dry contact, voltage-free) | Dry-contact relay contacts Opto-isolated inputs |
| Internal Sensors, overall system | DC Voltage(s) DC Current(s) Composite Forward RF output power, Composite Reverse RF power, ALC level |
| Summary Discrete I/O | Form-C Relays, dry-contacts Opto-isolated inputs |

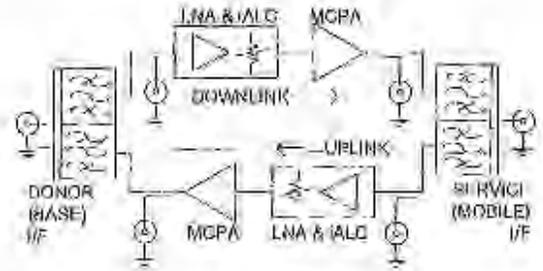
| Parameter | Specification |
|---|---|
| RF-OVER-FIBER TRANSCIVER SPECIFICATIONS (OPTIONAL) | |
| Isolated-Laser Optical Output Power | 4mW max |
| Wavelength | 1310 nm; single-mode (standard) 1510 nm special order WDM special order |
| Link Gain | 0 dB (maximum 10 dB optical link loss) |
| Connectors | RF: 50-Ohm Coaxial SMA and Optical: SC/APC (FC/APC optional) |
| Input Noise Floor | -151dBm/Hz (-110dBm @ 10kHz BW) |
| Input IP3 | +13dBm |
| Frequency Response (± 1.5 dB) | 750-870MHz |
| CUSTOM BUILD OPTIONS | |
| Duplexer for common TX/Rx antennas, or completely separate DL and UL paths; 50-Ohm Coaxial Type-N Fiber-fed; integrated very low noise RF/Optic transceivers. | |
| Multi-Carrier Power Amplifiers (MCPA) on donor and service interfaces are optional per system requirements. | |
| NFPA72-2010 compliant or Custom Input/Output status/monitoring functionality—for example: Open door, Low Battery, AC Power Failure, Smoke detector, Strobe light or Siren Indicator, etc. | |
| Sensors: DC Voltage Buffered Outputs 0-5V for external SCADA monitoring; MCPA DC Voltage/Current, Composite RF Output power, Temperature, RF output, ALC monitor, or others upon custom demand. | |



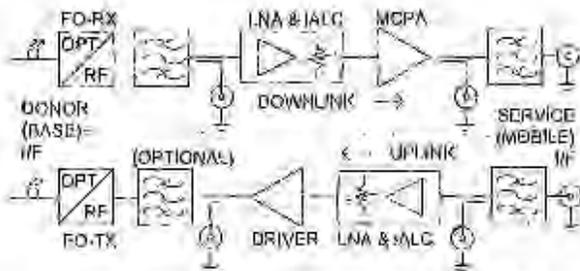
System conceptual block diagram



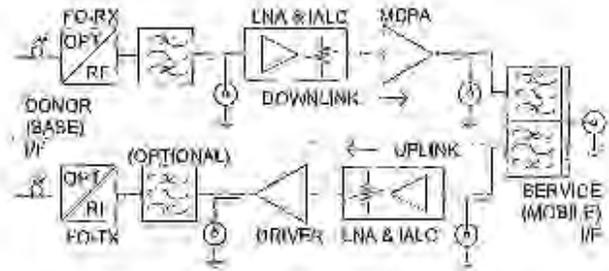
Config. #1: Separate Transmit and Receive ports on donor and service interfaces



Config. #2: Duplex ports on donor and service interfaces



Config. #3: Donor fiber-fed with separate Transmit and Receive port on service side interface



Config. #4: Donor fiber-fed with separate duplex port on service side interface



Ordering Information

M4 - BX AA BB CC F Y - ZZ

X: Depth (Rack Mount only)

L: 12" deep (external power amplifier)

M: 15" deep

N: 19" deep

AA: Uplink Starting Frequency

06: 806 MHz

09: 809 MHz

17: 817 MHz

BB: Bandwidth UL/DL

03: 3 MHz

10: 10 MHz

18: 18MHz

CC: Downlink Starting Frequency

51: 851 MHz

54: 854 MHz

66: 866 MHz

Y: Configuration

1: Config 1 3: Config 3

2: Config 2 4: Config 4

F: Fiber Optical equipment

F: Unit Integrates Fiber Optical Equipment

N: No Fiber Optical Equipment built-in

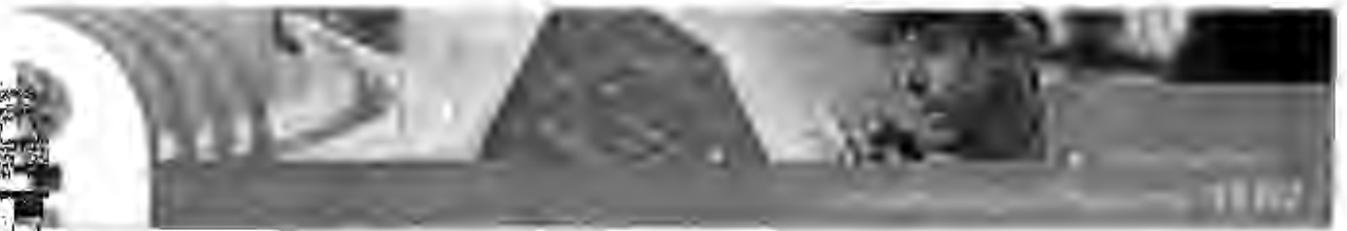
ZZ: Mounting

RM: Rack Mount WM: Wall Mount

Examples:

M4-6N060351F3-RM

Mark IV Broadband amplifier 3MHz BW, UL 806-809MHz / DL 851-854MHz with fiber optical interface at donor side (Config 3); Rack mount, 19" depth.



Part 90 Signal Boosters

THIS IS A CLASS "B" INDUSTRIAL SIGNAL BOOSTER for FCC Part 90 PLMRS (Public Safety Agencies) use.
WARNING: This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENSEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or express consent of an FCC Licensee to operate this device. You **MUST** register Class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.





Mark-IV Analog RF-over-Fiber modular subsystem.

RF Over Fiber-Optic Transceiver Link

Model: M4-FOTxRx-optic
Description: M4-FOTxRx-2N2S, Dual Fiber transceiver unit. 2RU, to feed two remote RRUs, rackmount, Type N, SC/APC-connectors.

Description: Wide-band Radio Frequency over Optical Fiber Transceiver sub-rack.

Summary:

The M4-FOTxRx-2RU is a wide-band fiber transceiver unit. The rack mount 1U modular EIA 310-D Standard 19" chassis can accommodate up to 4x TX/RX fiber links @ 1310nm, non-WDM.

The 2U form factor provides a high density RF-over-Fiber solution for Head End systems to interface Remote Repeater Units.

BY: RCC Consultants, Inc.
 JUN 01 2015

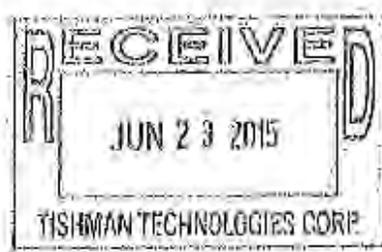
- 30 - 2700MHz Bandwidth
- Up to 9x TX/RX fiber optical links
- Front Fiber Management Bar
- Front & Rear Panel Alarm LED indicators
- 1U chassis @ 16in or 8in deep single slot enclosure
- Industrial Operating Case temperature
- MTTF > 90,000 hrs, @ +50°C
- High Dynamic Range
- Applications: VHE, UHF, LMR 700 & 800-MHz

RCC Consultants, Inc.

Transmittal #: 00049
 Project #: MF-100.511 wo#21
 Name: Rungecomm
 Date: 7/9/2015

Approved
 Approved as noted
 Disapproved
 Hold
 Resubmit

Note correct ordering part # is M4-FOTx Rx - 2N2S



wo#21, TTC-100.511- Follow Tunnel-800 Mhz In-Bldg Coverage
 Submittal 16785-055 REV0
 (FTU) Canam Fiber Transceiver Unit



Mark-IV Analog RF-over-Fiber modular subsystem.

Ordering Information

M4-FOTxRx-2 A n C

n: Number of TX/RX links on separate strands @ 1310nm, non-WDM. Up to 4x

A: RF Connector

N: N-Female

S: SMA-Female

C: Optical Connector

S: SC/APC

F: FC/APC

Examples:

M4-FOTxRx-2N2S: 2U chassis with 4x TX @ 1310nm and 4x RX modules, Type N-Female / SC/APC optical connectors.

THE PORT AUTHORITY OF NY & NJ

11 Erie Street
Jersey City, NJ 07310

Phone: 201-595-4751

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 8/22/2014

TO: Tishman Technologies
2 Gateway Center, 17th Floor
Newark, NJ 07102

Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: David Castaneda

| WE ARE SENDING: | STATUS LEGEND: | | SUBMITTED FOR: |
|--|-----------------------------------|---|---|
| <input type="checkbox"/> Shop Drawings | Approved (APP) | New Item (NBW) | <input type="checkbox"/> Approval |
| <input type="checkbox"/> Letter | Approved as Corrected (AAC) | Not Approved (NA) | <input type="checkbox"/> Your Use |
| <input type="checkbox"/> Prints | Approved as Noted (AAN) | Not Reviewed (NR) | <input type="checkbox"/> As Requested |
| <input type="checkbox"/> Change Order | For Record Only (FRO) | Review With Comments (RWC) | <input type="checkbox"/> Review and Comment |
| <input type="checkbox"/> Plans | For Your Information (FYI) | Review With No Comments (RWNC) | |
| <input type="checkbox"/> Samples | Incomplete (INC) | Superseded (SUPS) | |
| <input type="checkbox"/> Specifications | SENT VIA: | | DUE DATE: |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Attached | <input type="checkbox"/> Separate Cover Via: Fine Interoffice | |

| PACKAGE | SUBMITTAL | DWG. # | REV. | COPIES | DATE | DESCRIPTION | STATUS |
|---------|-----------|--------|------|--------|-----------|--|--------|
| 16785 | 16785-002 | | R000 | 6 | 8/22/2014 | Bird Tech 6dB Hybrid Ditectional Coupler | NA |
| 16785 | 16785-003 | | R000 | 4 | 8/22/2014 | PolyPhaser Flange Mount N/M-N/F | APP |
| 16785 | 16785-004 | | R000 | 4 | 8/22/2014 | Fiber-Span Telewave 800 Mhz SMR | APP |
| 16785 | 16785-005 | | R000 | 4 | 8/22/2014 | RFS 800 Mhz Outdoor Donor Antenna | APP |
| 16785 | 16785-006 | | R000 | 4 | 8/22/2014 | Comprod Communication Indoor Multi-Band Omni Antenna | APP |
| 16785 | 16785-007 | | R000 | 4 | 8/22/2014 | Commscope 1/2" Foam Helix Cable | AAN |
| 16785 | 16785-008 | | R000 | 4 | 8/22/2014 | Commscope 1/2" Plenum Air Cable | AAN |
| 16785 | 16785-009 | | R000 | 4 | 8/22/2014 | Wireles Solution Stackable Snap-In Hangers (10 Pack) | APP |
| 16785 | 16785-010 | | R000 | 4 | 8/22/2014 | Commscope 3' FSJ1-50A Jumper NM-NM | APP |



THE PORT AUTHORITY OF NY & NJ

TRANSMITTAL

No. 00020

241 Erie Street
Jersey City, NJ 07310

Phone: 201-595-4751

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 8/22/2014

TO: Tishman Technologies
2 Gateway Center, 17th Floor
Newark, NJ 07102

Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: David Castaneda

| WE ARE SENDING: | STATUS LEGEND: | | SUBMITTED FOR: |
|--|-----------------------------------|---|---|
| <input type="checkbox"/> Shop Drawings | Approved (APP) | New Item (NEW) | <input type="checkbox"/> Approval |
| <input type="checkbox"/> Letter | Approved as Corrected (AAC) | Not Approved (NA) | <input type="checkbox"/> Your Use |
| <input type="checkbox"/> Prints | Approved as Noted (AAN) | Not Reviewed (NR) | <input type="checkbox"/> As Requested |
| <input type="checkbox"/> Change Order | For Record Only (PRO) | Review With Comments (RWC) | <input type="checkbox"/> Review and Comment |
| <input type="checkbox"/> Plans | For Your Information (FYI) | Review With No Comments (RWNC) | |
| <input type="checkbox"/> Samples | Incomplete (INC) | Superseded (SUPS) | |
| <input type="checkbox"/> Specifications | SENT VIA: | | DUE DATE: |
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| PACKAGE | SUBMITTAL | DWG. # | REV. | COPIES | DATE | DESCRIPTION | STATUS |
|---------|-----------|--------|------|--------|-----------|--|--------|
| 16785 | 16785-011 | | R000 | 4 | 8/22/2014 | Wireless Solutions 3" RGS142 Jumper NM-NF | APP |
| 16785 | 16785-012 | | R000 | 4 | 8/22/2014 | Commscope 1/2" N Male Positive Stop | APP |
| 16785 | 16785-013 | | R000 | 4 | 8/22/2014 | Commscope Jumper Cold Shrink (Antenna to 1/2") | APP |
| 16785 | 16785-014 | | R000 | 6 | 8/22/2014 | Commscope Jumper Cold Shrink (7/8" to 1/2") | NA |
| 16785 | 16785-015 | | R000 | 6 | 8/22/2014 | Commscope 2-Way Splitters | NA |
| 16785 | 16785-016 | | R000 | 6 | 8/22/2014 | Commscope 3-Way Splitters | NA |
| 16785 | 16785-017 | | R000 | 4 | 8/22/2014 | Amphenol RF N/F-N/F Bulkhead Recept | AAN |
| 16785 | 16785-018 | | R000 | 4 | 8/22/2014 | (BSU) Fiber-Span Base Station Interface Unit | AAN |
| 16785 | 16785-019 | | R000 | 4 | 8/22/2014 | Fiber-Span Telewave 800MHz SMR Duplexer | APP |



THE PORT AUTHORITY OF NY & NJ

TRANSMITTAL

No. 00020

241 Erie Street
Jersey City, NJ 07310

Phone: 201-595-4751

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 8/22/2014

TO: Tishman Technologies
2 Gateway Center, 17th Floor
Newark, NJ 07102

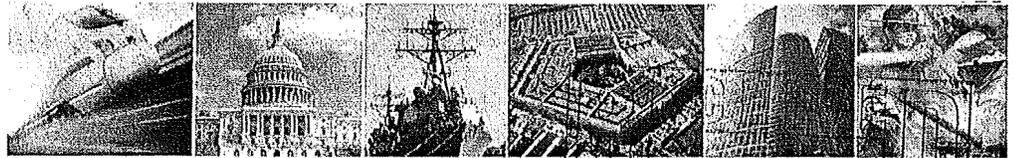
Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: David Castaneda

| WE ARE SENDING: | STATUS LEGEND: | | SUBMITTED FOR: |
|--|-----------------------------------|---|---|
| <input type="checkbox"/> Shop Drawings | Approved (APP) | New Item (NEW) | <input type="checkbox"/> Approval |
| <input type="checkbox"/> Letter | Approved as Corrected (AAC) | Not Approved (NA) | <input type="checkbox"/> Your Use |
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| <input type="checkbox"/> Plans | For Your Information (FYI) | Review With No Comments (RWNC) | |
| <input type="checkbox"/> Samples | Incomplete (INC) | Superseded (SUPS) | |
| <input type="checkbox"/> Specifications | SENT VIA: | | DUE DATE: |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Attached | <input type="checkbox"/> Separate Cover Via: Fine Interoffice | |

| PACKAGE | SUBMITTAL | DWG, # | REV. | COPIES | DATE | DESCRIPTION | STATUS |
|---------|-----------|--------|------|--------|-----------|---|--------|
| 16785 | 16785-020 | | R000 | 4 | 8/22/2014 | (RRU) Fiber-Span Remote Repeater Unit | AAN |
| 16785 | 16785-021 | | R000 | 6 | 8/22/2014 | Commscope 350-2700 MHz ION-B 2-Way Combiner | CLO |
| 16785 | 16785-022 | | R000 | 6 | 8/22/2014 | Commscope Cell/AWS/PCS ION-B Interface | CLO |
| 16785 | 16785-023 | | R000 | 6 | 8/22/2014 | Commscope Active 12 Slot AC Subrack | CLO |
| 16785 | 16785-024 | | R000 | 6 | 8/22/2014 | Commscope ION-B Optical Converter | CLO |
| 16785 | 16785-025 | | R000 | 5 | 8/22/2014 | Commscope Blank Panel For ION-B Subrack | CLO |
| 16785 | 16785-026 | | R000 | 4 | 8/22/2014 | (FTU) Fiber-Span Fiber Transceiver Unit | AAN |
| 16785 | 16785-027 | | R000 | 6 | 8/22/2014 | Belden 6 Strand Fiber Optic Cable | NA |
| 16785 | 16785-028 | | R000 | 4 | 8/22/2014 | Corning Wall Mounted Splice Box | AAN |



FS31B

Base Station Interface Unit (BSU)

Key Features :

- 100 - 1000 MHz Frequency Range
- Multi-band Configurations
- Accepts Duplexed or non-duplexed signal feeds from Donor Equipment

DESCRIPTION

Fiber-Span's Base Station Interface Unit (BSU) is designed to provide an interface between headend equipment, such as Bi-directional Amplifiers or direct connections to BTS/Repeaters systems, and the RF-on-Fiber® conversion equipment. The BSU is a passive device which can interconnect donor-side headend equipment, configured with a duplexed feed (both TX and RX on one coax), or a non-duplexed feed (TX and RX signals on separate coax lines). Within the BSU, RF signals are attenuated and power is divided in the downlink path (base-to-portable) and combined in the uplink path (portable-to-base).

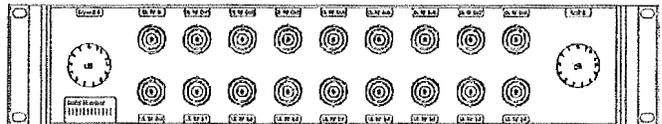
Each BSU configuration includes 10 dB of variable attenuation in both the uplink and downlink paths. Maximum downlink input power to the BSU, depending on port configuration, ranges from +8 dBm to +11 dBm. For non-duplexed configurations, typically an external 10-50 dB directional coupler in the downlink path, and 10-20 dB in the uplink path, will produce the best system performance. Fiber-Span offers a wide selection of directional couplers suitable for most applications.

The BSU port configuration choices (portable side) are 4, 6, or 8 ports. As depicted in the diagram below, the BSU interfaces directly with the Fiber Transceiver Units (FTUs), which provide the optical conversion and bi-directional communications to the Remote Repeater Units (RRUs). A 4-port BSU can

Front View



Rear View



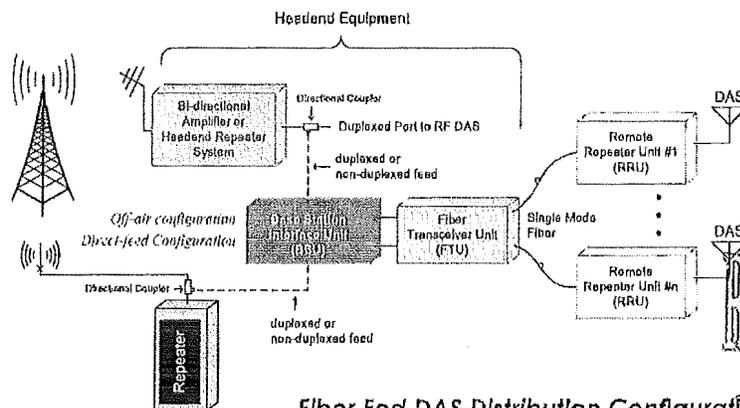
(8-Port Configuration Shown)

support up to 4 FTUs. If each FTU is a 4-port version, then a total of 16 RRUs can be supported by a 4-Port BSU. An 8-port BSU can support up to 32 RRUs. Multiple FTUs connected in parallel can be used to support any number of RRUs. Refer to data sheet DS31F-01 for determining which FTU model number best fits your application. Consult Fiber-Span Sales and Engineering staff for assistance in designing your RF on Fiber DAS.

All of FS3100E Series RRUs are equipped with comprehensive Alarm Monitoring and Control capabilities and are compatible with Fiber-Span's Network Management System. Alarm conditions are detected and relayed via subcarrier over the existing fiber network to an associated Fiber Transceiver Unit (FTU) typically co-located with the system Headend. A local Server (provided separately with the NMS option) can also act as an Internet gateway and SNMP-compliant interface to an external NOC or enterprise NMS facility. Consult Fiber-Span Sales for further details.

Applications :

- Shopping Malls
- Warehouses
- Parking Garages
- Airports
- Justice Centers
- Manufacturing Facilities
- Stadiums
- Convention Centers
- Universities



RECEIVED

AUG 04 2014

Fiber Fed DAS Distribution Configuration BY: *Beng Connell*
RCO-consultants, Inc

Fiber-Span is a world-leading manufacturer of RF ON FIBER® Communication Network Products for in-building, in-tunnel and outdoor coverage extension systems serving the Commercial Wireless, Public Safety, Government and Military markets.

3434 Rt. 22W, Suite 140 | Branchburg, New Jc

WO#21, TTC-100.511 - Holland Tunnel-800 Mhz In-Bldg Coverage
 Submittal 16785-018 REV0
 (BSU) Fiber-Span Base Station Interface Unit

FS31B | Specifications

Parameter

| | |
|--|---|
| Operational Range | 100 - 1000 MHz |
| Attenuation | 10 dB (1 dB increments) |
| Max. RF Input Level Downlink | 4 Port: +8dBm, 6 Port: +10 dBm, 8 Port: +12 dBm |
| Insertion Loss, attenuator @ position zero | 4 Port: -8dB, 6 Port: -10 dB, 8 Port: -12 dB |
| Input and Output VSWR | 2.0 : 1 |

Environmental

| | |
|-------------------------------|------------------|
| Operational Temperature Range | -30 to +75 deg C |
| Humidity | 10 to 95% |

Mechanical Specifications

| | |
|-------------------------------|--|
| Dimensions (W x H x D) inches | Rack-mount: 18 x 3.5 x 18 ¹ |
| Weight (approx.) | Wall-mount: < 10 lbs. |
| RF Connector Type | N-Female |

Ordering Information

| Identification | Part Number |
|----------------|--|
| FS31B | FS31BA-CC-BB-DD |
| | Where: A = Duplexed or Separate output ports (see table) |
| | CC = Frequency Sub-bands (see table) |
| | BB = Passbands (see table) |
| | DD = Number of Ports (see table) |

Duplexed or Separate Output Ports

- D = Configured to interface with Base Station or BDA device where TX & RX signals are duplexed onto a single port.
- S = Configured to interface with Base Station or BDA device where TX & RX signals appear on separate ports.

Frequency Sub-bands

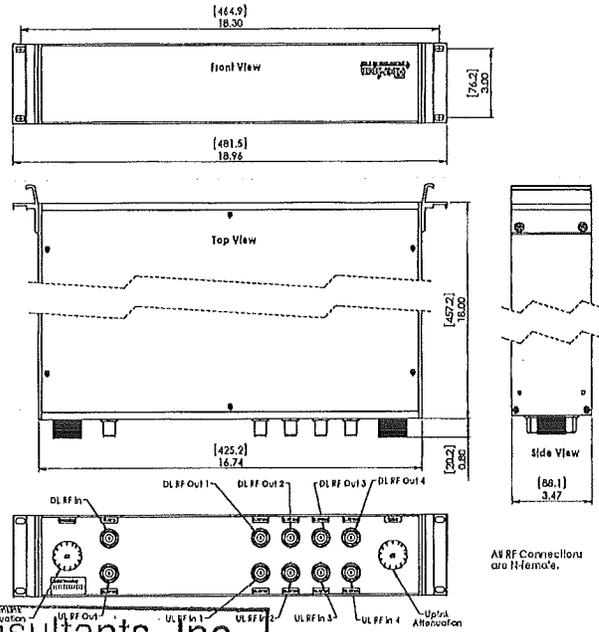
- 00 = No Duplexer² 40 = 380-430 MHz
- 46 = 450-470 MHz 49 = 470-512 MHz
- 85 = 806-869 MHz Passbands 87 = 824-894 MHz

Passbands Options

- 00 = No Duplexer²
- 1.2 = 1.2 MHz Passbands (Only in "49" Frequency Sub-band)
- 3.0 = 3.0 MHz Passbands (Only in "46" Frequency Sub-band)
- 5.0 = 5.0 MHz Passbands (Only in "40" Frequency Sub-band)
- 18 = 18 MHz Passbands (Only in "85" Frequency Sub-band)
- 25 = 25 MHz Passbands (Only in "87" Frequency Sub-band)

Number of Ports

- 04 = 4 ports
- 06 = 6 ports
- 08 = 8 ports



All RF Connections are N-Female.

RCC Consultants, Inc.

Transmittal #: 00007 (4-Port Configuration Shown)

Project #: MF-100-511 WO.# 2

Name: *hmcconnell*
Date: 8/10/14

- Approved
- Approved as noted
- Disapproved
- Hold
- Resubmit

Note:
Part # FS31B5-00-00-04

LITERATURE ORDER CODE: FS31B-01-0113-2v2



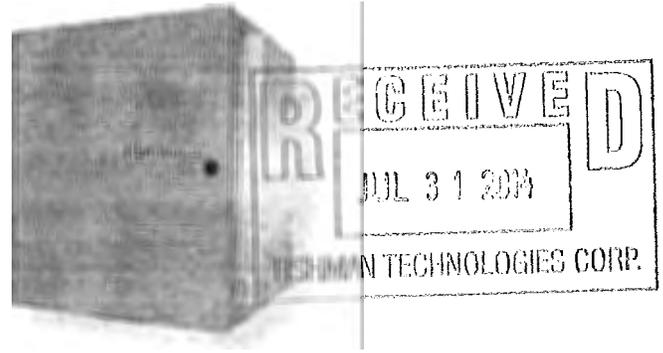


FS31R-85C ✓

806 - 869 MHz
Remote Fiber Repeater Unit (RRU)

Key Features :

- 806 - 869 MHz Frequency Range
- 5 Watt Linear Output Power
- Fault-Over-Fiber Feature
- 3, 15 and 18 MHz Passbands
- Rack-mount or Wall-mount Option



DESCRIPTION

RF On Fiber® technology offers a new and flexible layer to traditional Distributed Antenna System (DAS) design. Fiber optic cable is not only less expensive to purchase and install than its coaxial counterpart, but it is virtually bandwidth unlimited, making it ideal for multi-service solutions and applications where long runs of coax become cost prohibitive.

Fiber-Span offers a broad range of RF-on-Fiber product to fit most wireless applications. Fiber-Span's FS3100 Series of product is designed to offer a reliable, low cost, and easy to implement solution for in-building, in-tunnel, and outdoor DAS applications.

The FS31R-85C Remote fiber optic Repeater Unit (RRU) is part of Fiber-Span's FS3100 family of products and is designed to deliver up to +37 dBm of base-to-portable output power in the SMR band. It features an integrated high dynamic range fiber optic transceiver, a high gain, low distortion Silicon LDMOS Power Amplifier, and high-Q bandpass duplexer. Standard filter options for the RRU include 3, 15, and 18 MHz passbands. Consult Fiber-Span Sales for other filter configurations.

As depicted in the diagram below, a Fiber Transceiver Unit (FTU) is required to perform the RF-to-optical conversion at the Headend. The FTU can be ordered

for supporting up to 4 RRUs. Multiple FTUs can be used to support any number of RRUs. Refer to data sheet DS31F-01 for determining which FTU model number best fits your application. Consult Fiber-Span Sales for assistance in determining whether an HRU or BSU may be required for your application.

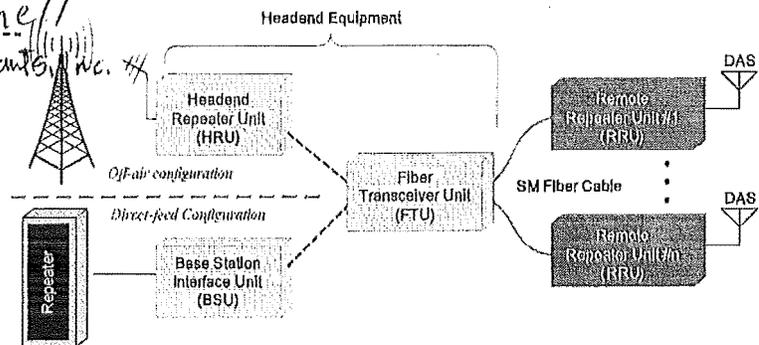
All of Fiber-Span's FS3100 series RRUs come standard with a Fault-over-Fiber feature that sends a summary fault condition over the uplink fiber path to the Headend Fiber Transceiver Unit (FTU). The summary fault condition appears as a dry contact relay at both the back panel of the FTU, and as a local alarm to the RRU.

RECEIVED
AUG 04 2014

Mr. Beng Connell
RCC Consultants, Inc.

Applications :

- Shopping Malls
- Warehouses
- Parking Garages
- Airports
- Justice Centers
- Manufacturing Facilities
- Stadiums
- Convention Centers
- Universities



Fiber-Fed DAS Distribution Configuration

Fiber-Span is a world-leading manufacturer of RF ON FIBER® Communication Network Products for in-building, in-tunnel and outdoor coverage extension systems serving the Commercial Wireless, Public Safety, Government and Military markets.

3434 Rt. 22W, Suite 140 | Branchburg, New Jersey

WO#21, TTC-100.511 - Holland Tunnel-800 Mhz In-Bldg Coverage

Submission 16785-020 REV0
(RRU) Fiber-Span Remote Repeater Unit

FS31R-85C | Specifications

| Parameter | Downlink | Uplink |
|--|---|---------------------|
| Operational Range | 851 - 869 MHz | 806 - 824 MHz |
| Available Passbands | 3, 15, & 18 MHz | |
| System Gain @ 4 dBo optical path loss | +40 dB | +32 dB |
| Composite Output Power | +37 dBm | +10 dBm |
| Gain Reduction (manual) | 30 dB (continuous) | 30 dB (continuous) |
| Max. RF Input Level | n/a | +10 dBm (no damage) |
| Uplink Noise Figure | < 1.1 dB at 4dBo | |
| Wideband Noise (dBm/Hz) | -92 dBm/Hz @ max gain | |
| Max. RF Output Power (per 25 KHz FM Channel) | 1 Carrier: +37 dBm, 2 Carriers: +34 dBm, 4 Carriers: +31 dBm, 8 Carriers: +28 dBm | |
| Spurious Emission | < -20 dBm | |

Environmental

| | |
|-------------------------------|-----------------|
| Operational Temperature Range | -5 to +50 deg C |
| Humidity | 10 to 95% |

Fiber Optic Parameters

| | |
|------------------------|---|
| Wavelength | 1310 nm |
| Laser type | DFB |
| Max. Optical Budget | Downlink: 4 - 10 dBo* Uplink: 10 dBo |
| Fiber Optic Cable Type | Single-Mode 9/125um |
| Connector Type | SC/APC |
| Back Reflections | < -50 dB typ. |

*Downlink fiber optic link budget is dependent on Headend FTU configuration.

Electrical

| | |
|-------------------|-----------------------|
| AC Power | 50/60 Hz, 115-230 VAC |
| Power Consumption | < 150 Watts |

Ordering Information

| | |
|----------------|--|
| Identification | Part Number |
| FS31R-85C | FS31R-85CBBYYX |
| | Where: BB = Bandwidth Options (see table) YY = Enclosure Type (see table) X = W or N (see WDM table) |

Bandwidth Option

| | |
|---------------------|---|
| 03=3 MHz Passbands | <input checked="" type="checkbox"/> 18=18 MHz Passbands |
| 15=15 MHz Passbands | |

Alarm Monitoring

| | |
|---------------------------------|---|
| Local Alarms Dry Contact Relay: | 1. Laser Over Current 2. Opt. Rx 3. PA 4. Temp 5. Auxillary |
| Remote Alarms: | Summary Fault sent to Headend FTU over fiber |

Mechanical Specifications

| | |
|-------------------------------|--|
| Dimensions (W x H x D) inches | Wall-mount: 16 x 18 x 9 Rack-mount: 19 x 7 x 21 |
| Weight (approx.) | Wall-mount: < 80 lbs. Rack-mount: 60 lbs. |

| | |
|--|--|
| RF Connector Type | Wall-mount: N-Female Rack-mount: SC |
| RCC Consultants, Inc. | |
| Transmittal #: | N-Female 00007 |
| Project #: | MF-100.511 WO # 2/ |
| Name: | bm@commell |
| Date: | 8/12/14 |
| <input type="checkbox"/> Approved <input checked="" type="checkbox"/> Approved as noted <input type="checkbox"/> Disapproved <input type="checkbox"/> Hold <input type="checkbox"/> Resubmit | |

Part #
FS31R-
85C18WMI

Enclosure Type

- RM=Rack Mount version
- WM=Wall Mount (indoor rating)
- 4X=Wall Mount NEMA 4X enclosure
- 40=Wall Mount NEMA 4 enclosure

WDM - Wavelength Division Multiplexing

- W=Tx & Rx signals are multiplexed onto a single fiber.
- N=Tx & Rx signals are on separate fiber strands.

LITERATURE ORDER CODE: FS31R-85C-01-0514_4v3



3434 Rt. 22W, Suite 140 | Branchburg, New Jersey 08876 | (908) 253.9080
www.fiber-span.com | techinfo@fiber-span.com



THE PORT AUTHORITY OF NY & NJ

TRANSMITTAL

No. 00011

241 Erie Street,
Jersey City, NJ 07310

Phone: 201 595-4756
Fax: 201 595-4606

PROJECT: MF-HT 800MHz Building RF Enhancement

DATE: 7/31/2014

TO: RCC Consultants, Inc.
100 Woodbridge Center Dr. Suite 201
Woodbridge, NJ 07095

Contract No: MF-100.511 WO#21

Reference: Submittals

ATTN: Beng Connell

| WE ARE SENDING: | STATUS LEGEND: | | SUBMITTED FOR: |
|--|-----------------------------------|--|---|
| <input type="checkbox"/> Shop Drawings | Approved (APP) | New Item (NEW) | <input type="checkbox"/> Approval |
| <input type="checkbox"/> Letter | Approved as Corrected (AAC) | Not Approved (NA) | <input type="checkbox"/> Your Use |
| <input type="checkbox"/> Prints | Approved as Noted (AAN) | Not Reviewed (NR) | <input type="checkbox"/> As Requested |
| <input type="checkbox"/> Change Order | For Record Only (FRO) | Review With Comments (RWC) | <input type="checkbox"/> Review and Comment |
| <input type="checkbox"/> Plans | For Your Information (FYI) | Review With No Comments (RWNC) | |
| <input type="checkbox"/> Samples | Incomplete (INC) | Superseded (SUPS) | |
| <input type="checkbox"/> Specifications | SENT VIA: | | DUE DATE: |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Attached | <input type="checkbox"/> Separate Cover Via: | |

| PACKAGE | SUBMITTAL | DWG. # | REV. | COPIES | DATE | DESCRIPTION | STATUS |
|---------|-----------|--------|------|--------|-----------|----------------------------|--------|
| 16785 | 16785-001 | | R000 | 8 | 7/31/2014 | Fiber Span Channelized BDA | NEW |

() Please make necessary corrections as noted, if any. Place approval form on original of each approved drawing or cut, insert date of approval within same and return _____ prints each. IT IS REQUESTED THAT THESE PRINTS BE RETURNED TO US WITHIN 5 DAYS.

() CLEAR TRANSPARENCY REQUIRED

The Contract required that the Contractor shall furnish to the engineer one set of drawings, all clearly revised, completed and brought up-to-date showing all of the permanent equipment, materials and construction as actually used.

Your earliest attention to these items would be greatly appreciated so as to avoid delay in the progress of the job.

Signed:

Very Truly Yours,

Amalia Fowler

CC: Transmittal Only: E. Chang / A. Kaprielian / M. Madigan
One Copy: Doc. Control

Tishman Technologies Corporation

2 Gateway Center
17th Floor
Newark, NJ 07102

Phone: 973.622.5600

TRANSMITTAL

No. 00010

PROJECT: WO#21 Holland Tunnel-800 MHz In-Bldg

DATE: 7/25/2014

TO: Port Authority of NY & NJ
241 Erie Street
Room 222
Jersey City, NJ 07310

REF: Contract No. MF-100.511

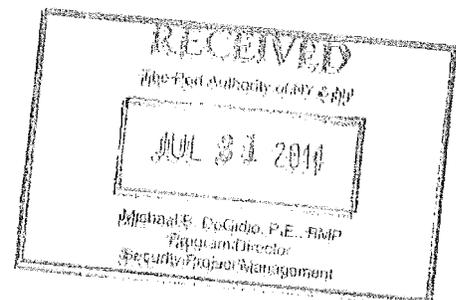
ATTN: Amalia Fowler

| WE ARE SENDING: | SUBMITTED FOR: | ACTION TAKEN: |
|--|---|---|
| <input type="checkbox"/> Shop Drawings | <input checked="" type="checkbox"/> Approval | <input type="checkbox"/> Approved as Submitted |
| <input type="checkbox"/> Letter | <input type="checkbox"/> Your Use | <input type="checkbox"/> Approved as Noted |
| <input type="checkbox"/> Prints | <input checked="" type="checkbox"/> As Requested | <input type="checkbox"/> Returned After Loan |
| <input type="checkbox"/> Change Order | <input type="checkbox"/> Review and Comment | <input type="checkbox"/> Resubmit |
| <input type="checkbox"/> Plans | | <input type="checkbox"/> Submit |
| <input type="checkbox"/> Samples | SENT VIA: | <input type="checkbox"/> Returned |
| <input type="checkbox"/> Specifications | <input checked="" type="checkbox"/> Attached | <input type="checkbox"/> Returned for Corrections |
| <input checked="" type="checkbox"/> Other: Made from Submittal | <input type="checkbox"/> Separate Cover Via: PA Live Link | <input type="checkbox"/> Due Date: |

| ITEM | PACKAGE | SUBMITTAL | DRAWING | REV. | ITEM NO. | COPIES | DATE | DESCRIPTION | STATUS |
|------|---------|-----------|---------|------|----------|--------|-----------|----------------------------|--------|
| SUT | 16785 | 16785-001 | | Rev0 | | 10 | 7/25/2014 | Fiber Span Channelized BDA | NEW |

Remarks: This submittal is being placed in Live Link and is not Confidential in nature. 9 copies are being sent to the PA-Document Control group.

This submittal item has a long lead time of 16 weeks, please expedite thru the EOR:



CC: Trans Only – D. Castaneda, Joshua Lee, Frank Gonzalez
Copy Only - Job File

Signed: 
William Cendales

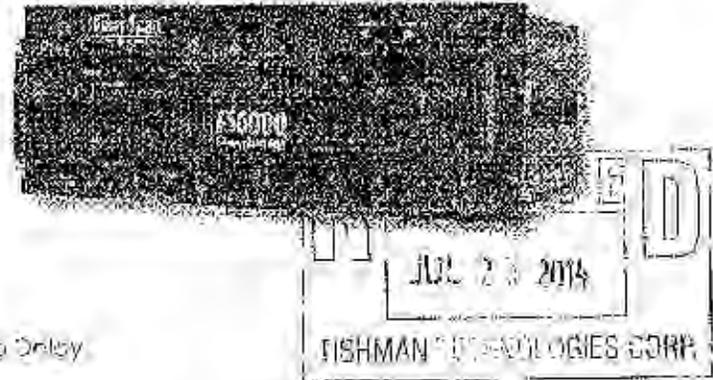


FS61C-85

806 - 869 MHz Digital Narrowband Signal Booster

Key Features

- 806 - 869 MHz Frequency Range
- Ideally suited for Public Safety applications
- 30 Watts Linear Composite Output Power
- Up to 20 full duplex channels in all modes up to
- 120 dB System Gain per channel
- NRE # 22 (compact wall-mount version)
- Individual AGC and Squelch settings per channel
- Filter-Fed DAS Configurations
- Programmable filter bandwidth, selectivity & Group Delay



DESCRIPTION

Fiber-Span's FS61C-85 Narrowband Digital technology integrates uplink and downlink programmable front-end narrowband filters with broadband Multi-Carrier Power Amplifiers (MCPAs) to deliver a Bi-Directional Narrowband Signal Booster.

The FS61C-85 uplink amplifiers can be specified as fully channelized narrowband filters tuned to transmit only your licensed channels. In compliance with the FCC definition for Class-A Signal Boosters, it can be configured with up to 10 or 20 fully programmable filters per path, Uplink and Downlink. The downlink path filters can be broader for reduced delays to accommodate the digital modulation signals timing constraints in the overlap

coverage areas. Each filter window has an input sensitivity of 105 dBm and ± 6 dB of available gain.

The FS61C-85 is a patent-pending design for multi-carrier two-way rebroadcast systems, where significantly high dynamic range is required on a channel-per-antenna basis, while delivering lower and faster group delay.

The individual AGC per channel feature essentially eliminates the uplink near-far concern prevalent in many Public Safety broadband DAS systems.

The filter's bandwidth and selectivity can be specified by the user in order to achieve very narrow filter windows, such as: for example, 70 dB rejection at 200 kHz offset for less than 1 μ s, or 70 dB rejection at 7.5 μ s offset at the

expense of 70 μ s of delay. The individual receive threshold level (RF Squelch) per filter ensures clean output spectrum with no amplified noise if in-active.

A variety of pre and post-rebanded internal duplexer options are available for additional interference protection and multi-service/multi-band compatibility over broadband DAS systems. Also available are configuration options that exclude the portable size duplexer and downlink MCPA for direct compatibility with Fiber Optic DAS systems.

Consult Fiber-Span Sales team for custom Bi-Directional Amplifier configurations and filter options including WDM. Refer to separate data sheets for VHF & UHF bands.

Applications

- Shopping Malls
- Warehouses
- Parking Garages
- Airports
- Casino Centers
- Manufacturing Facilities
- Schools
- Convention Centers
- Universities
- Jails
- Subways

W021, FCC 00-51 (E-Holman) "Unmanned 800 MHz In-Dig. Coverage"
Submission 16785-001 REV0
Fiber Span Channelized RLW

Fiber-Span is a world-leading manufacturer of RF ON FIBER® Communication Network Products for wire and/or fiber-optic access extension systems serving the Commercial/Wireless, Public Safety, Government and Military markets.

FS61C-85 | Specifications

Description

Specifications

| | |
|---|--|
| Frequency Range: | 806-824 MHz / 851-869 MHz range The overall system bandwidth per path (UL & DL) could be specified as 3, 7, 10, 15 or 18 MHz. |
| Narrowband filters Selectivity – Adjacent Channel Rejection (ACR): | 20-70 dB, The Filters Response-Type, Group Delay, Bandwidth and Selectivity are software-defined. |
| Absolute Group Delay: | 10-120 uSec, Software Selectable |
| NOTE: Absolute Group Delay, Selectivity and Response-type are software selectable off a standard library of filters or custom-filters upon order. Lower group delays are feasible at greater channel bandwidths. For example, one option can deliver ~30 uSec with 70 dB rejection @ 75KHz offset, and another option delivers < 13 uSec with 70 dB rejection at 200 KHz offset. Please consult Sales with your specific requirements. | |
| System net gain per filter window: | 50 dB |
| Automatic Gain Control (AGC) range, on a per filter-window basis: | 45 dB |
| Constant Output level regardless of input level variations, per filter: | -/- 2 dB |
| Broadband Input Automatic Level Control (IALC) range to prevent front-end undesired saturation, per path UL/DL: | 20 dB |
| Broadband input power attenuator adjustment range, per path UL/DL: | 15 dB |
| Maximum input power (composite) for no-damage, per path UL/DL: | -30 dBm |
| System OIP3: | > +58 dBm |
| System Composite Output Power: | 20 Watts |
| System Output Power Automatic Level Control (ALC), composite, factory limited for compliance with FCC Signal Boosters maximum power = 5W: | variable set-point 32 -- 37 dBm (5 Watts) |
| Composite output power level adjustment range: | 20 dB |
| Input (Rx) IM Rejection: | > 60 dB |
| Spurious & harmonics outputs: | < -36 dBm (EU), < -20 dBm (US) |
| RF Input & Output Impedance (typ): | 1.5:1 VSWR, built-in output circulators for infinite mismatch open load protection. |

Mechanical & Environmental

| | |
|--|--|
| Rackmount 19 in. shelf. (Optional wallmount enclosure upon request) | Up to 10 channels per path: 4RU enclosure, 22 inches depth Up to 20 channels per path: 6RU enclosure, 22 inches depth |
| Weight: | 4U enclosure: 44 lbs. (20 Kg), 6U enclosure: 55 lbs. (25 Kg) |
| Operating ambient temperature range: | -30 to +50° Celsius |
| Composite Output Power: | > 90,000 hours, > 70,000 hours (fiber-fed versions) |
| Power Requirements, 100-240 Vac 50/60Hz: | 300W |

Interface and Alarms

| | |
|------------------------------------|--|
| Human-Machine-Interface: | LCD display with 7-button keypad; LED Indicators |
| Computer Interface, Ethernet port: | Graphical User Interface (GUI) |
| Summary Alarms, Discrete I/O: | 4 Form-C Relays, 4 Opto-isolated inputs (dry-contacts) |

Ordering Information

Identification Part Number

FS61C FS61C-85XEEDYYZMM

Where: X=Downlink MCPA, (E=20Watt, N=No MCPA)
MM=Mounting (RM=Rack-mount, 4X=Nema 4X Wall-mount)
YY=Number of channels (08=8 ch's, 16=16 ch's)
Z=Mobile Side Duplexer (N= No Duplexer, D=Duplexer)²

DD=Duplexer Bandwidth:

3A=3 MHz, 806-809/851-854 MHz

3B=3 MHz, 821-824/866-869 MHz

07=7 MHz, 817-824/862-869 MHz

09=9 MHz, 806-815/851-860 MHz

15=15 MHz, 806-821/851-866 MHz

18=18 MHz, 806-824/851-869 MHz

Example: FS61C-85EE3A10NRM - 800 MHz SMR Channelized BDA, 20 watt uplink and downlink PAs, 3 MHz Passbands, 10 channels uplink, 10 channels downlink, non-duplexed output port, rack-mount configuration.

¹ No Downlink MCPA is required for configurations that interface with a Fiber Distribution System.

² Choose "N" to keep TX and RX ports separated for interfacing with a Fiber Distribution system (not included).