A & E Specifications of Fiber-optic Digital Single/Four-Channel Uni-/Bi-directional Audio Transceiver

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01 00 00 GENERAL REQUIREMENTS

01 10 00 SUMMARY

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This document covers the general design, construction, manufacture, and the general requirements for the supply and installation of the Fiber-optic Transmission Equipment catering for uni-/bi-directional audio transmission purposes.

01 30 00 ADMINISTRATIVE REQUIREMENTS

01 32 00 Construction Progress Documentation

01 32 19 Submittals Schedule:

(i) Product data sheet(s) produced by manufacturer for all types of Transceivers specified.

(ii) Product design drawings and connection diagrams:

a) Physical and mechanical drawings with all dimensions and mounting details included.
b) System connection diagrams include electrical and optical connections.
c) Manufacturer's installation and operational manuals for each type of Transmitters, Receivers, and Transceivers specified.
d) Manufacturer's warranty statement applicable to the types of products and accessories as specified.

01 40 00 QUALITY REQUIREMENTS

01 42 00 References

01 42 19 Reference Standards:

Relevant industrial standards and regulations have to be complied with, such as the BS, UL, FCC, CE, IP, etc., as applicable.

01 60 00 PRODUCT REQUIREMENTS

01 61 00 Common Product Requirements

Functions & Components:

(i) The products shall be capable of serving the transmission of single-/Four-channels Uni-/Bi-directional (Forward & Reverse) audio signals and shall be able to operate independently or as components of a fiber-optic transmission system with the following features:

a) the original analogue audio contents are digitalized in 24-bit PCM coded words at a sampling frequency of 48KHz;
b) to support bi-directional Balanced or Un-Balanced digital audio transmissions in compliance with the appropriate industry standards and specifications;
c) user external access for Balanced or Un-balanced audio selections;
d) capable of integrating with different types of optical modules for short, medium and long transmission coverage;
e) incorporated with protective devices for surge and transient suppression; and
f) compatibility and adaptability must be ensured aiming at system optimization and expansion in collaboration with the family products made by the same manufacturer.

(ii) The products and accessories deployed will sustain in an environment of adverse climate conditions as stipulated in the specifications.

(iii) All electronic components used for the manufacturing of the products must be of RoHS compliant.

01 62 00 Product Options

(I) Single-Mode Transmission Products:

S.1 1A (Uni-directional)

DFASMF01-TX/RX
Single-Mode Fiber-optic One-Channel Forward Audio Transmitter /Receiver.

S.2 1A (Bi-directional)

DFASMD01-TX/RX
Single-Mode Fiber-optic One-Channel Bi-Directional Audio Transceiver.

S.3 4A (Uni-directional)

DFASMF04-TX/RX
Single-Mode Fiber-optic Four-Channel Forward Audio Transmitter /Receiver.

S.4 4A (Bi-directional)

DFASMD04-TX/RX
Single-Mode Fiber-optic Four-Channel Bi-directional Audio Transceiver.

S.5 Long Distance 1A (Uni-directional)

DFASMLF01-TX/RX
Long Distance Single-Mode Fiber-optic One-Channel Forward Audio Transmitter /Receiver.

S.6 Long Distance 1A (Bi-directional)

DFASMLD01-TX/RX
Long Distance Single-Mode Fiber-optic One-Channel Bi-Directional Audio Transceiver.

S.7 Long Distance 4A (Uni-directional)

DFASMLF04-TX/RX
Single-Mode Fiber-optic One-Channel Forward Audio Transmitter /Receiver.

S.8 Long Distance 4A (Bi-directional)

DFASMLD04-TX/RX
Long Distance Single-Mode Fiber-optic Four-Channel Bi-directional Audio Transceiver.

(II) Multi-Mode Transmission Products:

M.1 1A (Forward)

DFAMMF01-TX/RX
Multi-Mode Fiber-optic One-Channel Forward Audio Transmitter /Receiver.

M.2 1A (Bi-directional)

DFAMMD01-TX/RX
Multi-Mode Fiber-optic One-Channel Bi-Directional Audio Transceiver.

M.3 4A (Forward)

DFAMMF04-TX/RX
Multi-Mode Fiber-optic Four-Channel Forward Audio Transmitter /Receiver.

M.4 4A (Bi-directional)

DFAMMD04-TX/RX
Multi-Mode Fiber-optic Four-Channel Bi-Directional Audio Transceiver.

01 65 00 Product Delivery Requirements

(i) Deliver all products and materials in original factory

packaging with bar coded information attached for destinations verifications.

(ii) Inspect products upon delivery to assure that specified products are received at site and in original packaging.

01 66 00 Product Storage and Handling Requirements

(i) Storage the products in original packaging in a climate controlled environment subject to conditions as specified by the manufacturer.

(ii) Handling with reasonable care and in a manner to avoid any damage caused during transportation, packaging and un-packaging and installation process.

01 80 00 PERFORMANCE REQUIREMENTS

01 86 00 Facility Services Performance Requirements

01 86 26 Electrical Performance Requirements:

The products shall be equipped with external power adaptors for powering the standalone units and the adaptors shall be of the characteristics as specified in the product specifications; and the card modules housed inside the rack-mount chassis are powered by the internal power supply unit within the chassis. The power adaptor and the rack-mount chassis derive energy from domestic supply outlets.

01 87 00 Equipment and Furnishings Performance Requirements

01 87 13 Equipment Performance Requirements:

(i) Single/Four-Channel Uni-/Bi-directional Audio Fiber-optic Transceiver are designed and integrated with either multi-mode or single-mode fiber-optic module to facilitating the signal transmissions for the required coverage within the designed optical budget.

(ii) The products support Balanced and Un-balanced Audio format.

(iii) The products shall be capable of working in single-mode at wavelength 1310nm or/and 1550nm.

(iv) The products shall also be capable of working in multi-mode at wavelength 1310nm or/and 1550nm.

(v) Detachable SFP Optical modules are employed as the laser source and detection devices for the transmission and recovery of the modulated light energy respectively. The SFP module also facilitates status monitoring and signal diagnosis features, such as the bias current of the laser diode, the transmitted and received optical power, etc. in collaboration with the NMS (refer to the NMS design document for more details). The change of the SFP optical module to suit for different wavelength and optical budget demands is just a simple plug-and–play job without any soldering works.

(vi) The deployment of the latest technologies, such as using optimum scale FPGA for internal digital signal processing and sophisticated MCU for supporting network management system (NMS) features, to improve the product performance with enhanced reliability and stability.

01 87 16 Furnishings Performance Requirements:

(i) The products supplied can be use as standalone units or card modules housing in a 19” standard rack-mount chassis.

(ii) Products shall be designed and manufactured to facilitate inspection, cleaning, removal, repair and future maintenance.

(iii) Only materials which do not support combustion and do not emit corrosive, noxious or toxic fumes when heated shall be used. Where it is not possible to meet these requirements, materials shall be selected which provide the minimum practicable hazard. Care shall be taken in the design and selection of materials to minimize the spread of fire in the event of its occurrence.

(iv) Each transceiver shall be a Type-tested Assembly (TTA). The TTA shall be a construction of self supporting enclosure with top, bottom and side panels of so formed as to give a rigid

welded construction without cross-struts, and to have clear accessibility to all internal components within the TTA. Metal work shall be treated to prevent corrosion before being painted. The panels and metal sheets shall not deform as a result of grit blasting. Treated metal work shall be suitably cleaned and degreased.

(v) In general, the TTA shall be constructed to conform to the appropriate IP standard as required, particularly for those standalone units installed outdoors. The equipment shall be suitable for continuous operation in such IP-compliant cabinet construction.

(vi) Detachable units/panels of the TTA shall each be provided with a pair of handles or alike for easy fixing/removal of such items. This may not be applicable to card modules and microtype standalone units.

(vii) The TTA shall be uniform in height and uniform in depth front-to-back throughout its length and shall present a neat and tidy appearance.

(viii) The TTA shall comply with the temperature rise test requirement as stipulated in the product specification.

(ix) The exterior of each TTA shall be finished to the specified colour with the end plates, blank panels and heads of any external fixing bolts or set screws finished to match.

(x) Unless otherwise specified, each TTA supplied shall be suitable for operation throughout the whole warranty period as stipulated in the product specification under the specified environmental conditions.

01 89 00 Site Construction Performance Requirements

01 89 13 Site Preparation Performance Requirements:

Products shall be able to operate and function properly in an environment under the conditions as specified by the manufacturer: For those products to be working under extreme adverse conditions exceeding the specified environmental limits, extra weather-proof & environmental

conditions control (e.g. temperature, humidity, waterproof, etc.) facilities shall be provided on site in accordance with the manufacturer's recommendation and the PCBs shall be furnished with a conformal coating as appropriate.

01 89 26 Site Electrical Utilities Performance Requirements:

Domestic supply outlets have to be provided in accordance with the local supply ordinance and Code of Practice for powering the equipment and accessories on site as required.

DIVISION 27 COMMUNICATIONS

27 00 00 COMMUNICATIONS

27 06 00 Schedules for Communications

27 06 20 Schedules for Audio Communications:

This document covers the general design, construction, manufacture, and the general requirements for the supply and installation of the Fiber-optic Transmission Equipment catering for data transmission purposes.

1. PRODUCTS AND COMPONENTS

		DF-Series Single-, Four-Channel Uni-/Bi-directional Audio Transceiver **1.1 Manufacturer** GE Security Inc. 8985 Town Center Parkway, Bradenton, FL-34202-5129 Telephone: Fax: Email: Web-site:
		1.2 Model Types: Single-mode, Single-mode (For Long

		Distance Transmission) and Multi-mode. For the details, please refer to appendix I.	
		1.3 Optical Modules All fiber-optic modules shall be supplied by one vendor for quality and compatibility assurance.	
		1.4 Product Specifications:	
		(A) Optical:	
		i) Fiber Size & Mode:	a) 9/125 micron, Single-mode b) 62.5/125 micron, multi-mode
		ii) No. of Fiber (s) required:	ONE
		iii) Optical devices:	SFP Optical Transceiver Modules
		iv) Wavelengths:	
		Bi-directional Audio DFASM**D**01/04-TX/RX DFASML**D**01/04-TX/RX DFAMM**D**01/04-TX/RX	1310nm and 1550nm (single-mode & multi-mode)
		Uni-directional Audio DFASM**F**01/04-TX/RX DFASML**F**01/04-TX/RX DFAMM**F**01/04-TX/RX	1310nm (single-mode & multi-mode)
		v) Optical Budget:	a) Single-mode (40Km) transmission: (i) Single-mode Forward: 14dB (ii) Single-mode Reverse: 18dB b) Single-mode (60Km) transmission: (i) Single-mode Forward: 19dB (ii) Single-mode Reverse: 25dB c) Multi-mode transmission for (i) Multi-mode Forward: 12dB (ii) Multi-mode Reverse: 12dB

		vi) Maximum Transmission Range:	a) 40Km (single-mode) b) 60Km (single-mode Long-Distance Type) c) 4Km
		vii) Number of Optical Ports:	a) Input (Rx): ONE, ST or FC Type b) Output (Tx): ONE, ST or FC Type
		(B) Audio:	
		(i)Input/Output Channels:	
		DFASM**F**0**1**-TX/RX DFASML**F**0**1**-TX/RX DFAMM**F**0**1**-TX/RX	ONE/ONE Forward ONE/ONE Forward ONE/ONE Forward
		DFASM**D**0**1**-TX/RX DFASML**D**0**1**-TX/RX DFAMM**D**0**1**-TX/RX	ONE/ONE Bi-directional ONE/ONE Bi-directional ONE/ONE Bi-directional
		DFASM**F**0**4**-TX/RX DFASML**F**0**4**-TX/RX DFAMM**F**0**4**-TX/RX	FOUR/FOUR Forward FOUR/FOUR Forward FOUR/FOUR Forward
		DFASM**D**0**4**-TX/RX DFASML**D**0**4**-TX/RX DFAMM**D**0**4**-TX/RX	FOUR/FOUR Bi-directional FOUR/FOUR Bi-directional FOUR/FOUR Bi-directional
		(ii) Input/Output Ports:	7-pin Screw Terminals
		(iii)Transmission direction/scheme:	
		DFASM**D**01/04-TX/RX DFASML**D**01/04-TX/RX DFAMM**D**01/04-TX/RX	Forward AND Reverse / Simplex & Duplex

		DFASM**F**01/04-TX/RX DFASML**F**01/04-TX/RX DFAMM**F**01/04-TX/RX	Forward / Simplex
		(iv) Audio interface	a) Balanced b) Un-balanced
		(v) Input/ Output Impedance (@1KHz)	≥10KΩ/≤600 Ω
		(vi) Output Level (input 1KHz@0dBm)	0dBm ±1dB
		(vii) Bandwidth	20Hz – 20KHz
		(viii) SNR	>70dB (A-wtgd.)
		(ix) THD (Ref.: 1KHz, 0dBm)	≦1 %
		(x) Surge and Transient Protection:	Two stages of protection: Line-Line and Line to Ground Surge/Transient Suppression at signal input and output ports to protect the products.
		(C) Status indications:	a) Power Presence/Absence b) Audio Transmit/Receive (Audio Level) c) Optical Carrier Detection
		(D) Physical:	Standalone Cabinet or Card Module
		i) Dimensions(mm):	a) 25.4 x 158.4 x 231.8 (1-Slot) b) 50.8 x 158.4 x 231.8 (2-Slot)
		ii) Weight:	a) 0.55kg (1-slot) b) 0.80kg (2-slot)
		(E) Power Supply Unit:	a) Standalone unit: Universal power adapter: Input: 110-240VAC, 50 or 60 Hz; Output: 12VDC b) Card module: powered by internal

			supply unit within the chassis
		(F) System Network Management capability & System Network compatibility:	a) Support the implementation of SNMP (Simple Network Management Protocol) for signal quality and system performance monitoring, alarm alerts and event messages reporting b) Compatible with all DF series data transmission products facilitating system optimization and/or expansion, as stipulated in Section **01 61 00** (i) (f) above.
		(G) Environmental:	
		i) Operating Temperature:	-40˚C ~ + 75˚C
		ii) Storage Temperature:	-40˚C ~ + 85˚C
		iii) Relative Humidity:	0 ~ 95% non-condensing
		(H) MTBF:	>100,000 Hours
		(I) International Standards Compliance:	CE, FCC, & UL

2. INSTALLATION REQUIREMENTS

2.1 General – Materials and Workmanship

a) Materials

i) All materials incorporated in the Works shall be suitable for the duty concerned and shall be new and of first class industrial quality, free from imperfections, and selected for long life and minimum maintenance under the specific site conditions.

ii) As far as practicable, the use of electrically dissimilar metals in contact shall be avoided. If this is not possible, the contact surfaces of the metals shall be electroplated or the metals shall be insulated from each other by an Approved method.

iii) All equipment supplied shall be of current industrial quality,

and of well-proven design.

iv) The above requirements may be relaxed by the Engineer in respect of certain components.

a) Workmanship

i) Workmanship – General

a) All parts which are subject to wear or damage by dust shall be totally enclosed in dust-proof housings, especially at outdoors.
b) The equipment shall operate without excessive vibration and with minimum noise, and shall also operate without excessive temperature rise at the rated load conditions.
c) The style and finish of the workmanship shall be consistent throughout the Works.

(ii) All items of the equipment shall be hardened to suit the conditions prevailing at site in general and all electrical components shall be housed in suitable enclosures which provide the required degree of protection.

Specifications and designs are subject to change without prior notice.

* *End of Document* *

Appendix I

Model type for Single-mode, Single-mode (For Long Distance Transmission) and Multi-mode.

Product Type		Model	Descriptions
(I) Single-mode	(i) 1A (Forward)	a) DFASMF01-TX	1-Ch. Forward Audio Transmitter
		b) DFASMF01-RX	1-Ch. Forward Audio Receiver
	(ii) 1A (Bi-directional)	a) DFASMD01-TX	1-Ch. Bi-directional Audio Transceiver
		b) DFASMD01-RX	1-Ch. Bi-directional Audio Transceiver
	(iii) 4A (Forward)	a) DFASMF04-TX	4-Ch. Forward Audio Transmitter
		b) DFASMF04-RX	4-Ch. Forward Audio Receiver
	(iv) 4A (Bi-directional)	a) DFASMD04-TX	4-Ch. Bi-directional Audio Transceiver
		b) DFASMD04-RX	4-Ch. Bi-directional Audio Transceiver
(II) Single-mode (For Long Distance Transmission)	(i) 1A (Forward)	a) DFASMLF01-TX	1-Ch. Forward Audio Transmitter
		b) DFASMLF01-RX	1-Ch. Forward Audio Receiver
	(ii) 1A (Bi-directional)	a) DFASMLD01-TX	1-Ch. Bi-directional Audio Transceiver
		b) DFASMLD01-RX	1-Ch. Bi-directional Audio Transceiver
	(iii) 4A (Forward)	a) DFASMLF04-TX	4-Ch. Forward Audio Transmitter
		b) DFASMLF04-RX	4-Ch. Forward Audio Receiver
	(iv) 4A (Bi-directional)	a) DFASMLD04-TX	4-Ch. Bi-directional Audio Transceiver
		b) DFASMLD04-RX	4-Ch. Bi-directional Audio Transceiver
(III) Multi-mode	(i) 1A (Forward)	a) DFAMMF01-TX	1-Ch. Forward Audio Transmitter
		b) DFAMMF01-RX	1-Ch. Forward Audio Receiver
	(ii) 1A (Bi-directional)	a) DFAMMD01-TX	1-Ch. Bi-directional Audio Transceiver
		b) DFAMMD01-RX	1-Ch. Bi-directional Audio Transceiver
	(iii) 4A (Forward)	a) DFAMMF04-TX	4-Ch. Forward Audio Transmitter
		b) DFAMMF04-RX	4-Ch. Forward Audio Receiver
	(iv) 4A (Bi-directional)	a) DFAMMD04-TX	4-Ch. Bi-directional Audio Transceiver
		b) DFAMMD04-RX	4-Ch. Bi-directional Audio Transceiver