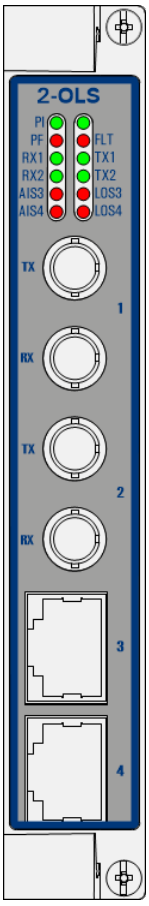
User Manual

Installation
Dragon PTN
Interface Module PTN-2-OLS with E1
PTN-2-OLS with T1



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Contents

List of figures

List of Tables

1. INTRODUCTION

1.1 General

This document is valid as of Dragon PTN Release 3.0DR.

The 2-OLS interface module (=IFM) is an Optical Low Speed Serial interface module with four ports: two Optical Serial ports (=port1, port2) and two E1 ports (=port3, port4). Each optical port has two ST connectors: one Rx (=Receive) and one Tx (=Transmit) ST. Each E1 port is an RJ-45 connector. This IFM will be used in point-to-point connection and:

- converts the incoming serial signal on port1 into E1 on port3 and vice versa;
- converts the incoming serial signal on port2 into E1 on port4 and vice versa;

This IFM can be used in any IFM slot of any node. An IFM slot overview can be found in Ref. [3] in Table 1.

CAUTION: This IFM is only a convertor module that needs to be powered via the node. It will not have backplane or Dragon PTN network access. The MPLS-TP Dragon PTN network is not required (or optional) for this IFM to operate.

The E1 links provide synchronous TDM links between two end points that can be used to transport over an external network e.g. SDH. The optical ports are the access ports whereas the E1 ports are the SDH interconnection ports. At the destination side, the 2-OLS receives the E1 traffic and converts it back to an optical low speed serial signal towards the end application.

In HiProvision (=Dragon PTN Management), an 'Optical Low Speed Serial' service can be configured between two optical ports, each port located in a different node. This service bundles together 32 TDM (Time Division Multiplex) connections resulting in a total bandwidth of 2.048 Mbps. The E1 side can slave its clock for example to the E1 clock from the external network.

NOTE: HiProvision can be configured redundantly.

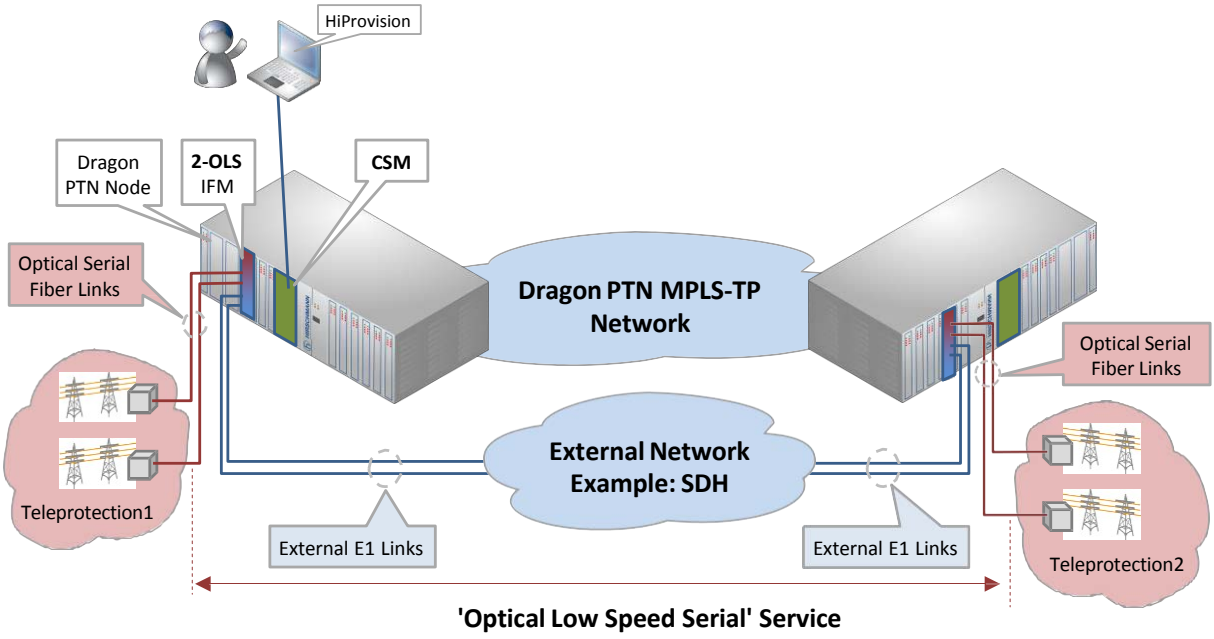

Figure 1 2-OLS - SDH Example

The main supported features are:

- No Dragon PTN network access;
- Converting optical serial into E1 and vice versa;
- Point-to-point connection;
- E1 port on 2-OLS IFM can slave to E1 clock from external network;
- Services: Optical Low Speed Serial in HiProvision;
  - Synchronous/asynchronous serial communication;

1.2 Manual References

Table 1 is an overview of the manuals referred to in this manual. '&' refers to the language code, '*' refers to the manual issue. All these manuals can be found in the HiProvision (=Dragon PTN Management System) Help function.

Table 1 Manual References

Ref.	Number	Title
[1]	DRA-DRM821-&-*	Dragon PTN and HiProvision Operation
[2]	DRA-DRM801-&-*	Dragon PTN Installation and Operation
[3]	DRB-DRM802-&-*	Dragon PTN Nodes: PTN2210, PTN2209, PTN2206, PTN1104
[4]	DRB-DRM803-&-*	Dragon PTN Switching Module: PTN-CSM310-A
[5]	DRA-DRM810-&-*	Dragon PTN General Specifications

2. MODULE DESCRIPTION

2.1 Front Panel

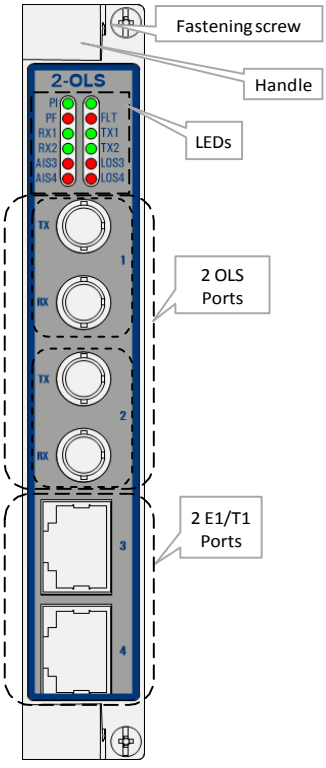

Figure 2 Front Panel

2.1.1 Handle

a. Insert the Module into the Node

Take the front panel handles to insert or slide the module into the Dragon PTN node. Push the module thoroughly into the node's backplane. Next, tighten the two fastening screws in the front panel corners.

b. Remove the Module from the Node

Untighten the two fastening screws in the front panel corners. Take the front panel handles to pull out and finally remove the module from the Dragon PTN node.

2.1.2 LEDs

The meaning of the LEDs depends on the mode of operation (= boot or normal) in which the 2-OLS module currently is running. After plugging in the module or rebooting it, the module turns into the boot operation, see Table 2. After the module has gone through all the cycles in the table below (=rebooted successfully), the module turns into the normal operation, see LEDs in Table 3.

Table 2 LED Indications In Boot Operation

Cycle	PI	PF	FLT	Spare LED	RX[1,2]	TX[1,2]	AIS[3,4]	LOS[3,4]
1	x	---	Slow blinking	---	---	---	---	---
2	x	---	Fast blinking	---	---	---	---	---
3	x	---	---	---	---	---	---	---
4	x	---	Fast blinking	---	x	x	x	x

x : LED is lit
--- : LED is not lit
The sub cycle times may vary.
The entire boot cycle time [1→4] takes approximately 2 minutes.

Table 3 LED Indications In Normal Operation

LED	Color	Status
PI (=Power Input)	Not lit, dark	+12V power input to the board not OK
	Green	+12V power input to the board OK
PF (=Power Failure)	Not lit, dark	power generation on the board itself is OK
	Red	power generation on the board itself is erroneous
FLT (=FauLT)	Not lit, dark	no other fault or error situation, different from PF, is active on the module
	Red	a fault or error situation, different from PF, is active on the module
RX<port n°>	Not lit, dark	no service programmed on this optical serial port
	Green, blinking	Service programmed, no optical serial port activity detected
	Green, lit	Service programmed, optical serial port activity detected
TX<port n°>	Not lit, dark	No service programmed on this optical serial port
	Green, blinking	Service programmed, optical serial port not sending out data
	Green, lit	Service programmed, optical serial port sending out data, no errors

LED	Color	Status
AIS<port n°> (=Alarm Indication Signal)	Not lit, dark	- no service on this port - service on this port: no alarms detected on backplane (=network) side, everything fine
	Red, lit	service on this port: no network traffic or TX AIS detected on backplane (=network) side
	Red, blinking	other errors different from TX AIS detected on backplane (=network) side
LOS<port n°> (Loss of Signal)	Not lit, dark	- no service on this port - service on this port: local E1 traffic on this front port is OK
	Red, lit	service on this port: local E1 signal is lost on this front port
	Red, blinking	AIS, LOF or RAI received on this front port

2.1.3 Optical Serial Port (Fiber)

The 2-OLS module provides two optical serial ports with each port having two ST (=Straight Tip) connectors: TX and RX. These ports can be used for communication over optical fiber.

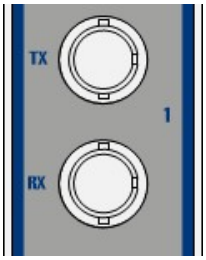

Figure 3 Optical Serial ST Connector

2.1.4 E1 RJ-45 Ports (Copper) and Cables

The 2-OLS module provides two E1 ports and each port connector has eight pins. Each port provides one tip/ring pair. See the table and figure below for an overview and description. The cables below can be ordered to connect these ports.

- E1 cable (120 Ω): ordering number 942 256-201.

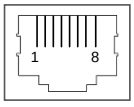

Figure 4 E1 RJ-45 Connector

Table 4 E1 RJ-45 Connector: Pin Assignments

Pin Number	Description	Cable Wire Colors
1	Rx (Receive) RING	OG
2	Rx (Receive) TIP	WH/OG
3	Not connected	-
4	Tx (Transmit) RING	BU
5	Tx (Transmit) TIP	WH/BU
6, 7 ,8	Not connected	-

2.2 Functional Operation

2.2.1 General

See §1.1.

2.2.2 E1 Framing

E1 is a 2.048 Mbps bi-directional (full duplex) link through which the data is transported in a digital way in frames. One frame consists of 32 time slots (Figure 5). Timeslot 0 is used for framing and synchronization, and time slot 16 for signaling. The bandwidth of one time slot is 64 kbps (=8 bits/125 µs). One frame thus consists of 32*8 = 256 bits and lasts 125 µs. Typically 16 frames are packed together in one multiframe.

NOTE: Multiframe = future support;

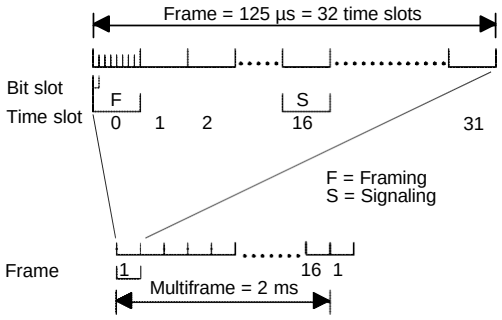

Figure 5 E1 Framing

2.2.3 E1 Coding: AMI, HDB3

AMI, HDB3 are different types of line coding. HDB3 is used in E1. The 2-OLS module supports HDB3 for E1. HDB3 is an enhancement of AMI. For this reason, AMI is mentioned here as well.

As the E1 link has no separate clock transmission, the receiver will derive the clock from the incoming data stream. A minimum density of logical ones is required in order to guarantee a faultless clock recovery. This is achieved basically by AMI which encodes the data stream with bipolar violations. A more enhanced and better encoding is HDB3 which enhances the AMI stream by replacing successive zeros:

- E1→ HDB3: replace four successive zeros with a fixed bit pattern ‘000V’ or ‘B00V’;

A ‘B’ and ‘V’ can either be ‘-‘ or ‘+’. Which pattern is used depends on the amount of ‘+’ and ‘-‘ already received from send on the link.

Figure 6 HDB3 Encoding

2.2.4 FM0 Coding (Biphase Space Encoding)

FM0 Coding is a biphase 'space' encoding ('space' = 0-bit; 'mark' : 1-bit) that can be used in serial data communication. FM0 encoding guarantees to have a transition (from high to low or vice versa) in every data bit. This encoded data contains sufficient transitions to recover a clock from the data. Further advantages are the DC balancing resulting in enhanced signal reliability.

With FM0 Coding enabled, a 0-bit (='space') will always have an extra transition halfway its bit time (=2 phases = biphase) whereas a 1-bit will have no transition within its bit time.

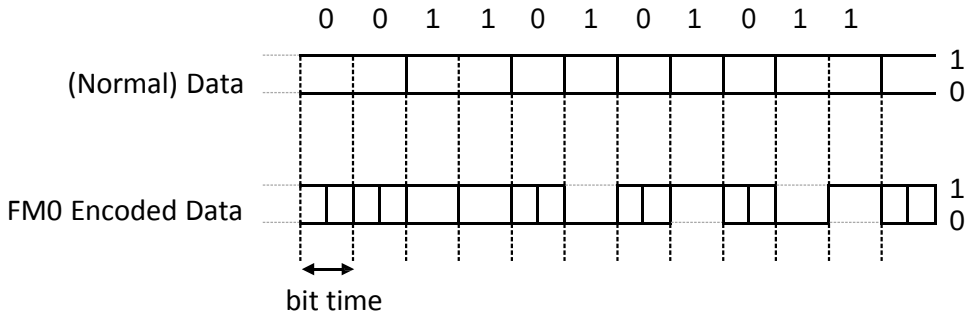

Figure 7 FM0 Coding

FM0 Coding:

- disabled (=default): Normal data (without encoding) is expected at the optical serial RX ports. Normal data (without encoding) is generated at the optical serial TX ports;
- enabled: FM0 encoded data is expected at the optical serial RX ports. FM0 encoded data is generated at the optical serial TX ports;

2.2.5 Short Haul/Long Haul on E1 Ports

Long E1 links (>200m, Long Haul) have more signal attenuation than shorter links (<200m, Short Haul). As a result, the signal levels or sensitivity ('0' or '1') on the receiver side must be configured according the used link: Long Haul or Short Haul.

In HiProvision, a Short Haul parameter can be checked for Short Haul links and unchecked (=default) for Long Haul links. This parameter can be set on port level in the IFM or at service creation.

2.2.6 Service: Optical Low Speed Serial

The 'Optical Low Speed Serial service' is a point-to-point service between two optical serial ports, each port located in a different node, see §1.1. This service can be configured in HiProvision (=Dragon PTN management system). It converts the incoming serial signal into E1 and vice versa.

Within one 2-OLS IFM, [port 1 <-> port3] and [port 2 <-> port4] are always linked via a fixed local loopback including the conversion. See next figure:

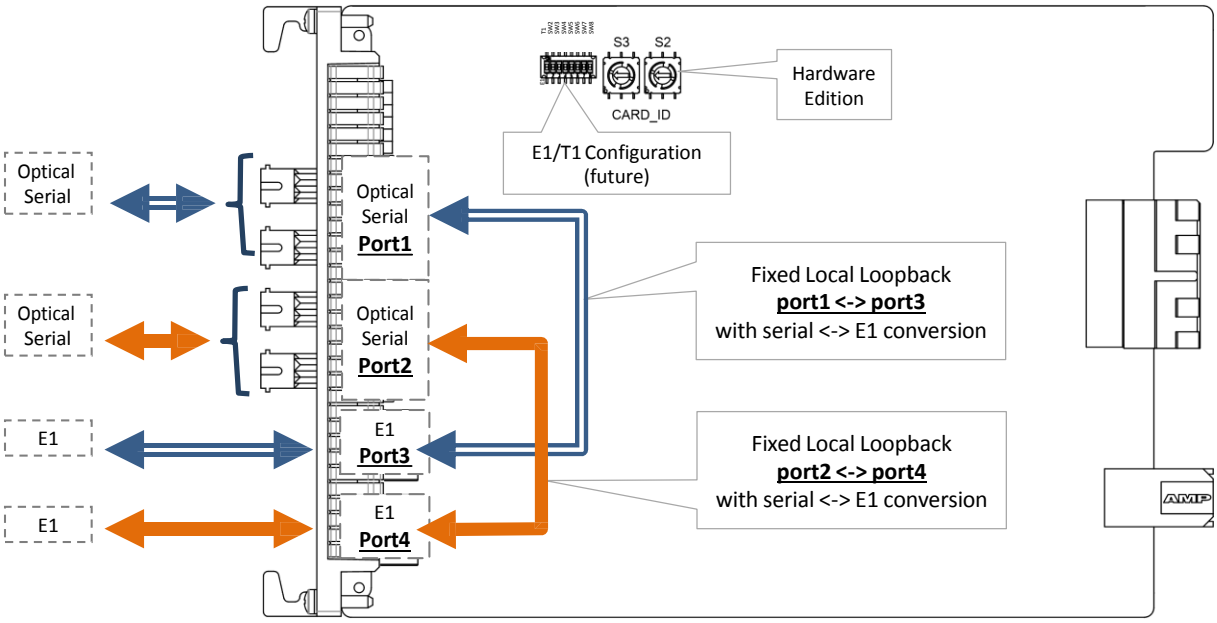

Figure 8 2-OLS IFM Side View: Local Loopbacks

Following can be configured during service creation:

- Optical Serial Ports:
  - Synchronisation: synchronous or asynchronous;
  - Synchronous:
    - Bitrate: [64 (=1*64), 128 (=2*64), 512(=8*64), 1984(=31*64)] kbps;
    - FM0 Coding (see §2.2.4): disabled/enabled;
  - Asynchronous:
    - Bitrate: [1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, 297600] bps; When a bit rate is selected, an incoming serial signal with a lower bitrate will operate as well, because 2-OLS samples at 6.6 times the selected bitrate;
- E1 Ports:
  - Short Haul (see §2.2.5): unchecked (=default) /checked;

2.2.7 I/O with the Central Switching Module (=CSM)

The CSM is only needed to program the 2-OLS IFM via HiProvision. Once the 2-OLS IFM has been configured, it does not need the CSM anymore.

2.2.8 Test and Loopback Selftests

Test and Loopback selftests can be performed (via HiProvision) in CESes, e.g when configuring or troubleshooting a CES. Following two functions can be used in a programmed CES:

- Loopbacks: on backplane or front port, direction towards line (=application) or network can be configured;
- BERT: test traffic generation and verification via Bit Error Ratio Tester.

2.3 Onboard Interfaces

See Figure 8 for a side view of the IFM module.

2.3.1 Straps

No user relevant straps.

2.3.2 DIP Switches

a. Hardware Edition

The Hardware Edition is set in decimal code using rotary switches S2 to S3 (=most significant). It can be read out as well via HiProvision. This edition has been factory set and MUST NOT BE CHANGED!

Example: Setting S3='0' and S2='5' indicates Hardware Edition '5' (dec).

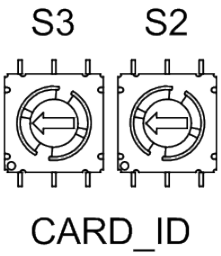

Figure 9 Hardware Edition

b. E1/T1 Configuration

The E1/T1 configuration of the 2-OLS module is factory set by the S1 DIP switch into E1 mode and must not be changed. The configuration can be read out via HiProvision.

- Switch = E1: both E1/T1 ports operate as E1 ports, use the '2-OLS-E1-L' IFM in HiProvision;
- Switch = T1 (=future): both E1/T1 ports operate as T1 ports, use the '2-OLS-T1-L' IFM in HiProvision.

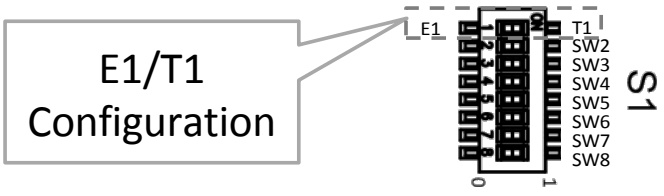

Figure 10 E1/T1 Configuration

3. MODULE SPECIFICATIONS

3.1 General Specifications

For general specifications like temperature, humidity, EMI... see Ref.[5] in Table 1.

3.2 Other Specifications

Table 5 Other Specifications

Description	Value
Weight	0.23 kg / 0.5 lb
MTBF	87 years at 25°C/77°F
Power Consumption	8.4 W (measured at 25°C/77°F)
Module Size	width: 20.32 mm / 0.8 inches height: 126 mm / 4.96 inches depth: 195 mm / 7.68 inches

3.3 Ordering Information

- 2-OLS with E1: future support;
- 2-OLS with T1: future support;

4. ABBREVIATIONS

AIS	Alarm Indication Signal
AMI	Alternate Mark Inversion
CE	Conformité Européenne
CSM	Central Switching Module
DC	Direct Current
EMI	Electromagnetic Interference
ERR	Error
ETH	Ethernet
FLT	Fault
HDB3	High Density Bipolar of Order 3
IEEE	Institute of Electrical and Electronics Engineers
IFM	InterFace Module
kbps	Kilobit per Second
LAN	Local Area Network
LOF	Loss Of Framing
LOS	Loss Of Signal
LVD	Low Voltage Directive

Mbps	Megabit per Second
MPLS-TP	MultiProtocol Label Switching – Transport Profile
MSB	Most Significant Bit
MTBF	Mean Time Between Failures
OLS	Optical Low Speed
PF	Power Failure
PI	Power Input
PTN	Packet Transport Network
PTP	Point to Point
RAI	Remote Alarm Indicator
SDH	Synchronous Digital Hierarchy
SF	Super Frame
ST	Straight Tip
TDM	Time Division Multiplex