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# Centellis 2x00 User Card-10GE

Installation and Use

P/N: 6806800H33E

January 2020

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Embedded Computing

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# About this Manual

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## Overview of Contents

This manual is intended for users qualified in electronics or electrical engineering. Users must have a working understanding of AdvancedTCA and telecommunications. This manual provides the information you need to install, access and operate the Centellis 2x00 User Card-10GE. Additionally you need the *System Management Interface Based on HPI-B (Centellis 2000/2100/4411) User's Guide* to adopt the hardware platform interface.

The manual contains the following chapters and appendix:

[Safety Notes on page 15](#) describes the safety information which has to be regarded.

[Sicherheitshinweise on page 19](#) provides a German translation of the safety notes.

[Chapter 1, Introduction on page 23](#) gives an overview of the product.

[Chapter 2, Centellis 2x00 User Card-10GE Hardware on page 29](#) provides detailed hardware information of the product.

[Chapter 3, Controls, Indicators and Connectors on page 37](#) describes external interfaces of the product, this includes connectors and LEDs.

[Chapter 4, Board Exchange on page 41](#) describes the exchange prerequisites and procedures.

[Appendix A, Related Documentation on page 47](#) lists related documentation and specifications.

## Abbreviations

This document uses the following abbreviations:

Abbreviation	Definition
AdvancedTCA ATCA	Advanced Telecommunications Computing Architecture
AMC	Advanced Mezzanine Card
API	Application Programming Interface
BT	Block Transfer
CGE	Carrier Grade Edition
CO	Central Office
CPCI	Compact Peripheral Component Interconnect
ECC	Embedded Communications Computing

## About this Manual

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<b>Abbreviation</b>	<b>Definition</b>
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Immunity
EMV	Elektromagnetische Vertraeglichkeit
EN	European Norm
ESD	Electrostatic Sensitive Device
FCC	Federal Communications Commission
FPGA	Field-Programmable Gate Array
FRU	Field Replacable Unit
FI	Fabric Interface
GbE	Gigabit Ethernet
GmbH	Gesellschaft mit beschraenkter Haftung
GND	Ground
HPI	Hardware Platform Interface
IEC	International Electric Code
IPM	Intelligent Platform Management
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
LVDS	Low Voltage Differential Signal
MAC	Media Access Control
MIB	Management Information Base
MMC	Mezzanine Management Controller
MO	Managed Object
NEBS	Network Equipment Building System
OID	Object Identifier
OOB	Out-of-Band
OOS	Out-Of-Service
PCB	Printed Circuit Board
PEM	Power Entry Module
PICMG	PCI Industrial Computer Manufacturers Group

Abbreviation	Definition
RoHS	Restriction of the use of Certain Hazardous Substances
RTM	Rear Transition Module
SAF	Software Availability Forum
SELV	Safety Extra Low Voltages
ShM	Shelf Manager
SFP	Small Form-factor Pluggable
UL	Underwriters Laboratory Inc.
VCCI	Voluntary Control Council for Interference
VIP	Virtual IP Address








## Conventions

The following table describes the conventions used throughout this manual.

Notation	Description
0x00000000	Typical notation for hexadecimal numbers (digits are 0 through F), for example used for addresses and offsets
0b0000	Same for binary numbers (digits are 0 and 1)
<b>bold</b>	Used to emphasize a word
Screen	Used for on-screen output and code related elements or commands. Sample of Programming used in a table (9pt)
<b>Courier + Bold</b>	Used to characterize user input and to separate it from system output
<i>Reference</i>	Used for references and for table and figure descriptions
File > Exit	Notation for selecting a submenu
<text>	Notation for variables and keys
[text]	Notation for software buttons to click on the screen and parameter description
...	Repeated item for example node 1, node 2, ..., node 12
.	Omission of information from example/command that is not necessary at the time

## About this Manual

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Notation	Description
..	Ranges, for example: 0..4 means one of the integers 0,1,2,3, and 4 (used in registers)
	Logical OR
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury
	Indicates a property damage message
	Indicates a hot surface that could result in moderate or serious injury
	Indicates an electrical situation that could result in moderate injury or death
<p data-bbox="274 1159 388 1215"><b>Use ESD protection</b></p> 	Indicates that when working in an ESD environment care should be taken to use proper ESD practices
	No danger encountered, pay attention to important information

## Summary of Changes

Document Number	Date	Description
6806800H33E	January 2020	Rebrand to SMART Embedded Computing template. Updated title. Updated Centellis 2000 to Centellis 2x00 throughout the document. Updated SMART EC Documentation table.
6806800H33D	May 2016	Removed <i>Declaration of Conformity</i> .
6806800H33C	May 2014	Rebranded to Artesyn.
6806800H33B	December 2012	Updated <a href="#">Standard Compliances on page 27</a> .
6806800H33A	September 2010	First edition



# Safety Notes

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This section provides warnings that precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed during all phases of operation, service, and repair of this equipment. You should also employ all other safety precautions necessary for the operation of the equipment in your operating environment. Failure to comply with these precautions or with specific warnings elsewhere in this manual could result in personal injury or damage to the equipment.

SMART Embedded Computing intends to provide all necessary information to install and handle the product in this manual. Because of the complexity of this product and its various uses, we do not guarantee that the given information is complete. If you need additional information, ask your SMART EC representative.

The product has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control.

Only personnel trained by SMART EC or persons qualified in electronics or electrical engineering are authorized to install, remove or maintain the product.

The information given in this manual is meant to complete the knowledge of a specialist and must not be used as replacement for qualified personnel.

Keep away from live circuits inside the equipment. Operating personnel must not remove equipment covers. Only factory authorized service personnel or other qualified service personnel may remove equipment covers for internal subassembly or component replacement or any internal adjustment.

Do not install substitute parts or perform any unauthorized modification of the equipment or the warranty may be voided. Contact your local SMART EC representative for service and repair to make sure that all safety features are maintained.

## EMC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by SMART EC could void the user's authority to operate the equipment. Board products are tested in a representative system

## Safety Notes

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to show compliance with the above mentioned requirements. A proper installation in a compliant system will maintain the required performance. Use only shielded cables when connecting peripherals to assure that appropriate radio frequency emissions compliance is maintained.

## Installation

Before installing the board, make sure the requirements listed in section "Board Exchange" are met.

Restricted access area - This board is only to be installed in a restricted access area.

### **Data Loss**

Removing the board with the blue LED still blinking causes data loss.

Wait until the blue LED is permanently illuminated, before removing the board.

### **Damage of Circuits**

Electrostatic discharge and incorrect board installation and removal can damage circuits or shorten their life.

Before touching the board or electronic components, make sure that you are working in an ESD-safe environment or wear ESD wrist straps.

### **Board Malfunctioning**

Incorrect board installation and removal can result in board malfunctioning.

Make sure that the board is connected to the system backplane via all assembled connectors and that power is available on all zone 1 power pins.

### **Damage of the Product**

Incorrect installation of the product can cause damage of the product,

Only use handles when installing/removing the product to avoid damage/deformation to the face plate and/or PCB.

### **Damage of the Product and Additional Devices and Modules**

Incorrect installation or removal of additional devices or modules may damage the product or the additional devices or modules.

Before installing or removing additional devices or modules, read the respective documentation.



### Operation

#### **Board Damage–Board Surface**

High humidity and condensation on the board surface causes short circuits.

Do not operate the board outside the specified environmental limits. Make sure the board is completely dry and there is no moisture on any surface before applying power.

#### **Board Overheating and Board Damage**

Operating the board without forced air cooling may lead to board overheating and thus board damage.

When operating the board, make sure that forced air cooling is available in the shelf.

#### **Injuries or Short Circuits–Board or Power Supply**

In case the ORing diodes of the board fail, the board may trigger a short circuit between input line A and input line B so that line A remains powered even if it is disconnected from the power supply circuit (and vice versa).

To avoid damage or injuries, always check that there is no more voltage on the line that has been disconnected before continuing your work.

### Hot Swap

Installing the board into or removing it from a powered system not supporting hot swap or high availability causes board damage and data loss. Therefore, only install it in or remove it from a powered system if the system itself supports hot swap or high availability and if the system documentation explicitly includes guidelines.

### Replacement/Expansion

Only replace or expand components or system parts with those recommended by SMART EC. Otherwise, you are fully responsible for the impact on EMC or any possible malfunction of the product.

Check the total power consumption of all components installed (see the technical specification of the respective components). Ensure that any individual output current of any source stays within its acceptable limits (see the technical specification of the respective source).

### Environment

Always dispose of used products according to your country's legislation and manufacturer's instructions.

# Safety Notes

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# Sicherheitshinweise

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Dieses Kapitel enthält Hinweise, die potentiell gefährlichen Prozeduren innerhalb dieses Handbuchs vorangestellt sind. Beachten Sie unbedingt in allen Phasen des Betriebs, der Wartung und der Reparatur des Systems die Anweisungen, die diesen Hinweisen enthalten sind. Sie sollten außerdem alle anderen Vorsichtsmaßnahmen treffen, die für den Betrieb des Produktes innerhalb Ihrer Betriebsumgebung notwendig sind. Wenn Sie diese Vorsichtsmaßnahmen oder Sicherheitshinweise, die an anderer Stelle dieses Handbuchs enthalten sind, nicht beachten, kann das Verletzungen oder Schäden am Produkt zur Folge haben.

SMART Embedded Computing ist darauf bedacht, alle notwendigen Informationen zum Einbau und zum Umgang mit dem Produkt in diesem Handbuch bereit zu stellen. Da es sich jedoch um ein komplexes Produkt mit vielfältigen Einsatzmöglichkeiten handelt, können wir die Vollständigkeit der im Handbuch enthaltenen Informationen nicht garantieren. Falls Sie weitere Informationen benötigen sollten, wenden Sie sich bitte an die für Sie zuständige Geschäftsstelle von SMART EC.

Das System erfüllt die für die Industrie geforderten Sicherheitsvorschriften und darf ausschließlich für Anwendungen in der Telekommunikationsindustrie und im Zusammenhang mit Industriesteuerungen verwendet werden.

Einbau, Wartung und Betrieb dürfen nur von durch SMART EC ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal durchgeführt werden. Die in diesem Handbuch enthaltenen Informationen dienen ausschließlich dazu, das Wissen von Fachpersonal zu ergänzen, können dieses jedoch nicht ersetzen.

Halten Sie sich von stromführenden Leitungen innerhalb des Produktes fern. Entfernen Sie auf keinen Fall Abdeckungen am Produkt. Nur werksseitig zugelassenes Wartungspersonal oder anderweitig qualifiziertes Wartungspersonal darf Abdeckungen entfernen, um Komponenten zu ersetzen oder andere Anpassungen vorzunehmen.

Installieren Sie keine Ersatzteile oder führen Sie keine unerlaubten Veränderungen am Produkt durch, sonst verfällt die Garantie. Wenden Sie sich für Wartung oder Reparatur bitte an die für Sie zuständige Geschäftsstelle von SMART EC. So stellen Sie sicher, dass alle sicherheitsrelevanten Aspekte beachtet werden.

## EMV

Das Produkt wurde in einem SMART EC Standardsystem getestet. Es erfüllt die für digitale Geräte der Klasse A gültigen Grenzwerte in einem solchen System gemäß den FCC-Richtlinien Abschnitt 15 bzw. EN 55022 Klasse A. Diese Grenzwerte sollen einen angemessenen Schutz vor Störstrahlung beim Betrieb des Produktes in Gewerbe- sowie Industriegebieten gewährleisten.

## Sicherheitshinweise

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Das Produkt arbeitet im Hochfrequenzbereich und erzeugt Störstrahlung. Bei unsachgemäßem Einbau und anderem als in diesem Handbuch beschriebenen Betrieb können Störungen im Hochfrequenzbereich auftreten.

Wird das Produkt in einem Wohngebiet betrieben, so kann dies mit großer Wahrscheinlichkeit zu starken Störungen führen, welche dann auf Kosten des Produktanwenders beseitigt werden müssen. Änderungen oder Modifikationen am Produkt, welche ohne ausdrückliche Genehmigung von SMART EC durchgeführt werden, können dazu führen, dass der Anwender die Genehmigung zum Betrieb des Produktes verliert. Boardprodukte werden in einem repräsentativen System getestet, um zu zeigen, dass das Board den oben aufgeführten EMV-Richtlinien entspricht. Eine ordnungsgemäße Installation in einem System, welches die EMV-Richtlinien erfüllt, stellt sicher, dass das Produkt gemäß den EMV-Richtlinien betrieben wird. Verwenden Sie nur abgeschirmte Kabel zum Anschluss von Zusatzmodulen. So ist sichergestellt, dass sich die Aussendung von Hochfrequenzstrahlung im Rahmen der erlaubten Grenzwerte bewegt.

Warnung! Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen. In diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen.

## Board Installation

Bevor Sie das Board in einem System installieren, überprüfen Sie, ob die im Kapitel "Board Exchange" aufgeführten Anforderungen erfüllt werden.

Bereich mit eingeschränktem Zugang - Installieren Sie das Board in ein System nur in Bereichen mit eingeschränktem Zugang.

### **Datenverlust**

Ziehen Sie das Board im laufenden Betrieb heraus, obwohl die Hot-Swap LED noch nicht leuchtet, führt das zu Datenverlust.

Warten Sie deshalb bis die Hot-Swap LED blau leuchtet, bevor Sie das Board herausziehen.

### **Beschädigung von Schaltkreisen**

Elektrostatische Entladung und unsachgemäßer Ein- und Ausbau des Produktes kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen.

Bevor Sie das Produkt oder elektronische Komponenten berühren, vergewissern Sie sich, dass Sie in einem ESD-geschützten Bereich arbeiten.

### **Fehlfunktion des Produktes**

Fehlerhafter Ein- und Ausbau des Produktes kann zur Beschädigung des Produktes führen.

Stellen Sie deshalb sicher, dass das Produkt mit allen Steckern mit der Systembackplane verbunden ist und über alle Zone-1-Anschlüsse mit Spannung versorgt wird.

### **Beschädigung des Produktes**

Fehlerhafte Installation des Produktes kann zu einer Beschädigung des Produktes führen.

Verwenden Sie die Handles, um das Produkt zu installieren/deinstallieren. Auf diese Weise vermeiden Sie, dass das Face Plate oder die Platine deformiert oder zerstört wird.

### **Beschädigung des Produktes und von Zusatzmodulen**

Fehlerhafte Installation von Zusatzmodulen, kann zur Beschädigung des Produktes und der Zusatzmodule führen.

Lesen Sie daher vor der Installation von Zusatzmodulen die zugehörige Dokumentation.

## Betrieb

### **Beschädigung des Boards**

Hohe Luftfeuchtigkeit und Kondensat auf der Oberfläche des Boards können zu Kurzschlüssen führen.

Betreiben Sie das Board nur innerhalb der angegebenen Grenzwerte für die relative Luftfeuchtigkeit und Temperatur. Stellen Sie vor dem Einschalten des Stroms sicher, dass sich auf dem Board kein Kondensat befindet.

### **Überhitzung und Beschädigung des Boards**

Betreiben Sie das Board ohne Zwangsbelüftung, kann das Board überhitzt und schließlich beschädigt werden.

Bevor Sie das Board betreiben, müssen Sie sicher stellen, dass das Shelf über eine Zwangskühlung verfügt.

### **Verletzungen oder Kurzschlüsse–Board oder Stromversorgung**

Falls die ORing Dioden des Boards durchbrennen, kann das Board einen Kurzschluss zwischen den Eingangsleitungen A und B verursachen. In diesem Fall ist Leitung A immer noch unter Spannung, auch wenn sie vom Versorgungskreislauf getrennt ist (und umgekehrt).

Prüfen Sie deshalb immer, ob die Leitung spannungsfrei ist, bevor Sie Ihre Arbeit fortsetzen, um Schäden oder Verletzungen zu vermeiden.

## Sicherheitshinweise

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### Hot Swap

Wenn Sie das Board im laufenden Betrieb in ein System, das weder Hot Swap noch High Availability unterstützt, installieren bzw. herausziehen, wird das Board beschädigt und es gehen Daten verloren. Installieren/entfernen Sie das Board nur im laufenden Betrieb, wenn das System Hot Swap oder High-Availability unterstützt und wenn die Systembeschreibung dies ausdrücklich erlaubt.

### Austausch/Erweiterung

Verwenden Sie bei Austausch oder Erweiterung nur von SMART EC empfohlene Komponenten und Systemteile. Andernfalls sind Sie für mögliche Auswirkungen auf EMV oder Fehlfunktionen des Produktes voll verantwortlich.

Überprüfen Sie die gesamte aufgenommene Leistung aller eingebauten Komponenten (siehe die technischen Daten der entsprechenden Komponente). Stellen Sie sicher, dass die Stromaufnahme jedes Verbrauchers innerhalb der zulässigen Grenzwerte liegt (siehe die technischen Daten des entsprechenden Verbrauchers).

### Umweltschutz

Entsorgen Sie alte Batterien und/oder Produkte stets gemäß der in Ihrem Land gültigen Gesetzgebung und den Empfehlungen des Herstellers.

# Introduction

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## 1.1 Overview

The Centellis 2x00 User Card is an independent Field Replaceable Unit (FRU) for the Centellis 2x00 system. It hosts an PHY for converting a 10Gbps XAUI Ethernet signal to a Small Form-factor Pluggable (SFP) connector on the face plate. It has independent power supply derived from the 48V and a 3.3V management supply. It supports full management access via two IPMBs and accesses one Fabric Interface (FI) of the corresponding AdvancedTCA blade.

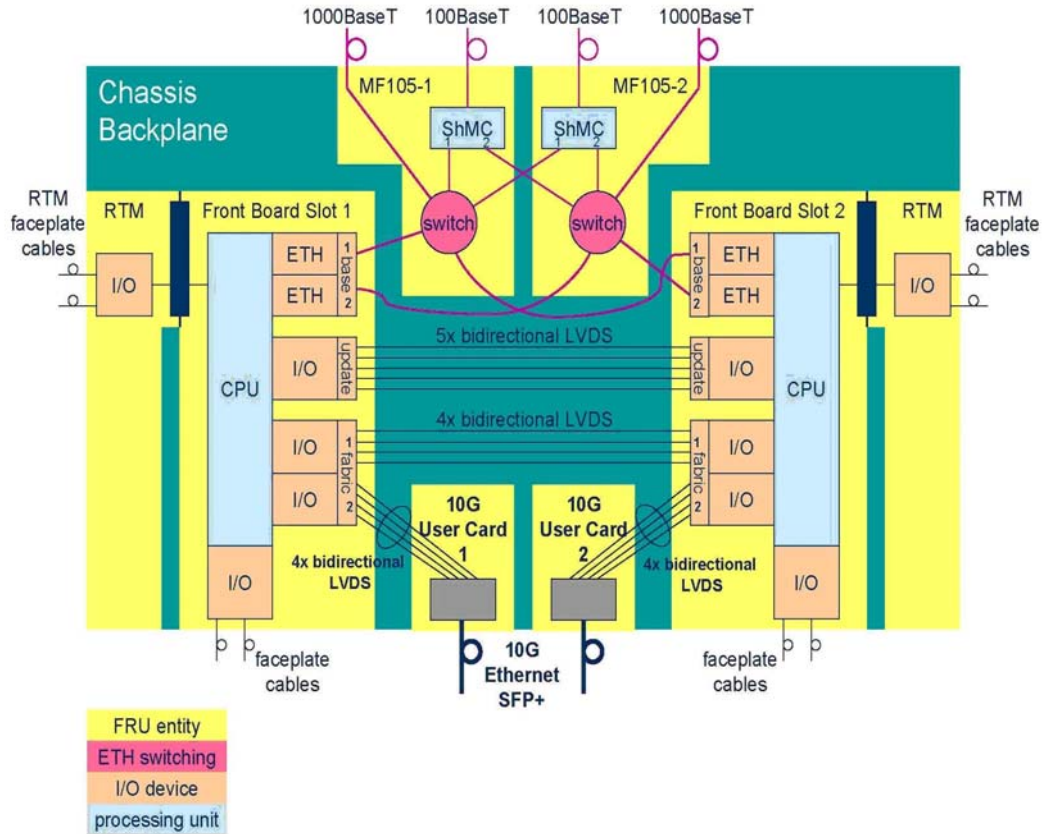
The Centellis 2x00 User Card-10GE module is intended to be used in a Centellis 2x00 chassis. The module when installed in the dedicated User Card slot provides uplink connectivity from the payload Ethernet fabric channel.

*Figure 1-1* shows the functional block diagram of the Centellis 2x00 chassis including the two 10G User Cards in the lower part of the figure.

Each 10G User Card is connected through the chassis backplane to fabric channel 2 of one front board via 4x bidirectional Low Voltage Differential Signal (LVDS) signals. The LVDS signals provide the XAUI 10G Ethernet interface which is converted by the 10G User Card to a serial 10G Ethernet interface on an SFP+ module.

# Introduction

Figure 1-1 Functional Block Diagram of the Centellis 2x00 Chassis





## 1.2 Hardware

The following figure gives an overview about the main parts of the board.

*Figure 1-2 Overview*

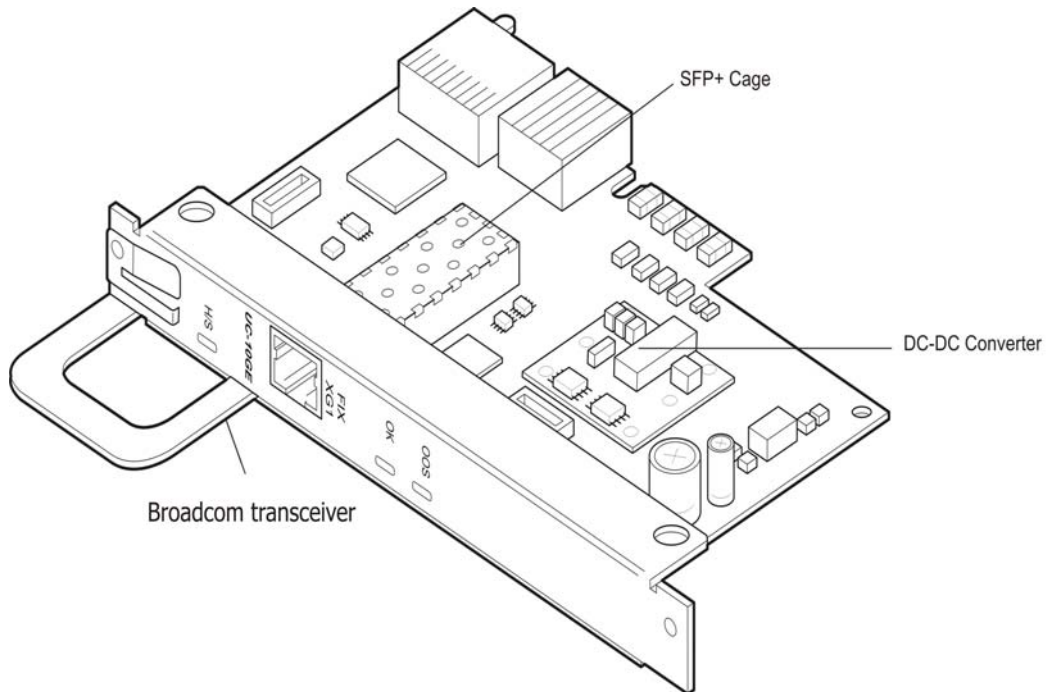
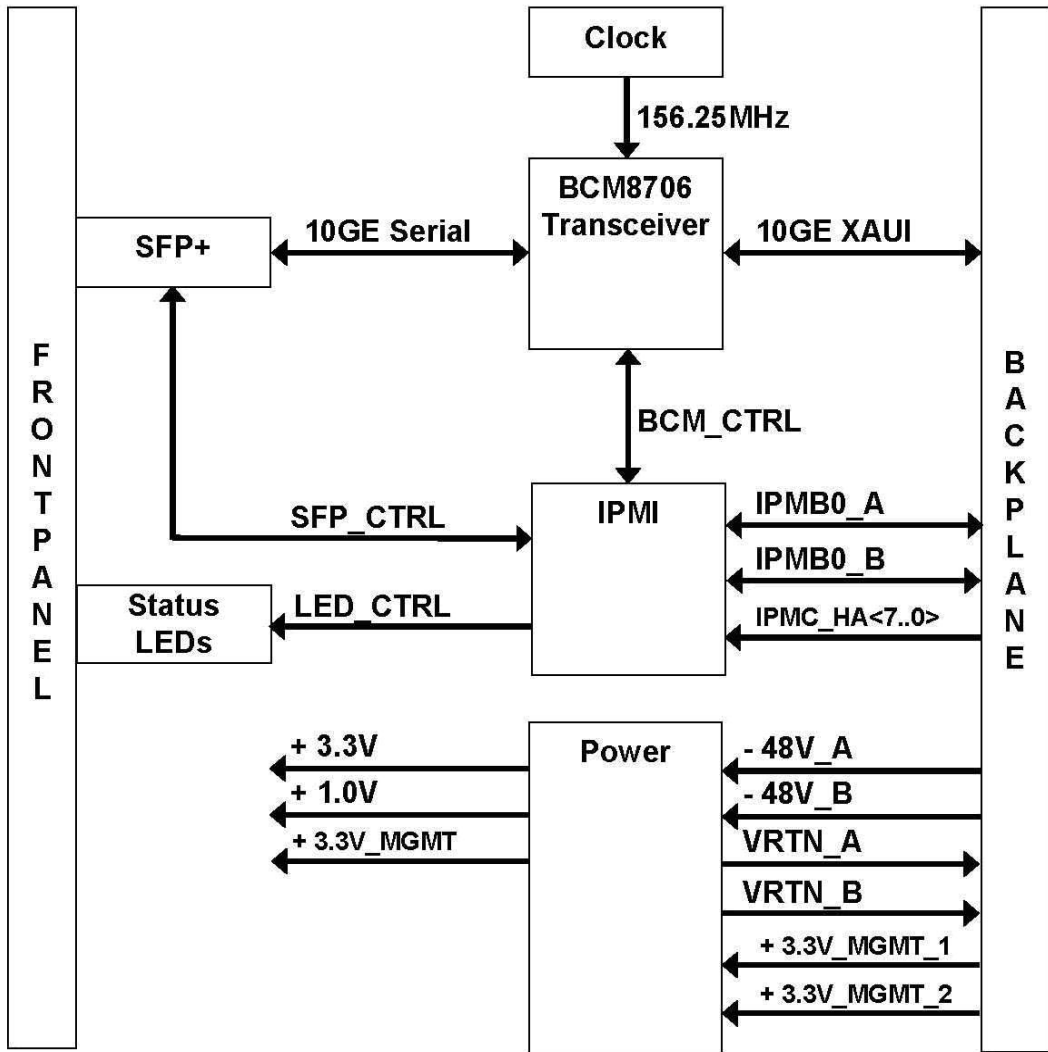


Figure 1-3 Block Diagram



## 1.2.1 Functional Characteristics

- Transceiver
  - BCM8706 10GE Serial-to-XAUI 10GBASE-LRM transceiver
  - Compliant to IEEE 802.3ae and IEEE 802.3aq

- Clock
  - 156.25MHz clock oscillator and SY58013UMG clock driver for BCM8706s differential 156.25MHz reference clock
- SFP+/SFP+ modules
  - Optical MMF module for distances up to 300m
  - Copper cable assembly for distances up to 25m
- IPMI
  - PICMG 3.1 compliant IPMI subsystem
- Power
  - Dual -48V sourced via backplane
  - Dual +3.3V management power sourced via backplane
  - Local power generation of +5.0V, +3.3V and +1.0V
- Power on reset generation and power supervision

## 1.3 Standard Compliances

The Centellis 2x00 User Card-10GE, when installed in a compliant chassis, meets the following standards:

*Table 1-1 Standard Compliances*

Standard	Description
UL 60950-1 EN 60950-1 IEC 60950-1 CAN/CSA C22.2 No 60950-1	Legal safety requirements
CISPR 22 CISPR 24 EN 55022 EN 55024 FCC Part 15 Industry Canada ICES-003 VCCI Japan AS/NZS CISPR 22 EN 300 386 NEBS Standard GR-1089 CORE	Legal EMC requirements on system level (predefined SMART EC system)

## Introduction

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Table 1-1 Standard Compliances (continued)

Standard	Description
ANSI/IPC-A610 Rev.C Class 2 ANSI/IPC-7711 ANSI/IPC-7721 ANSI-J-001...003	Manufacturing requirements
NEBS Standard GR-63-CORE ETSI EN 300 019 series	Environmental requirements
PICMG 3.0 R3.0	Defines mechanics, blade dimensions, power distribution, power and data connectors, and system management



**The product has been designed to meet the directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) Directive (EU) 2015/863 (amending Annex II to Directive 2011/65/EU).**

## 1.4 Ordering and Support Information

Refer to the data sheets for the Centellis 2000 and Centellis 2100 for a complete list of available variants and accessories. Refer to [Appendix A, Related Documentation](#) or consult your local SMART Embedded Computing sales representative for the availability of other variants.

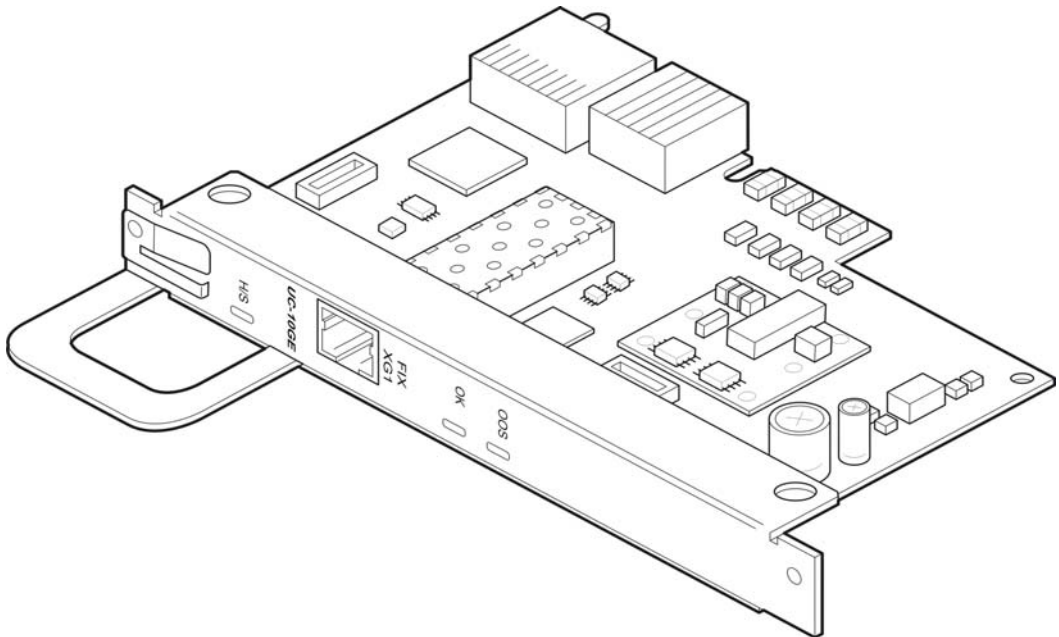
For technical assistance, documentation, or to report product damage or shortages, contact your local SMART Embedded Computing sales representative or visit <https://www.smartembedded.com/ec/support/>.

# Centellis 2x00 User Card-10GE Hardware

## 2.1 Overview

The Centellis 2x00 User Card-10GE is compliant to PICMG 3.0 R3.0 (AdvancedTCA). The shelf manager and hub board is equipped with two backplane connectors.

*Figure 2-1 Hardware*



To prevent connector damage the alignment pin offers a guide rail to the slot and a coding mechanism to ensure the installation of the board in the matching slot.

The hardware consists of:

- Payload hardware section with
  - Ethernet interfaces to the backplane and to the face plate
- IPMI controller section with
  - IPMB0-A and IPMB0-B interface to the backplane
  - Handle switch and status LED interface to the face plate
- Power supply

## 2.2 Payload Hardware

The payload hardware of the Centellis 2000 User Card-10GE is always powered when power supply is present.

The following interfaces are available:

- Fabric 2 ethernet interface to payload slot
- SFP+ 10GE ethernet interface resident on the front panel

### 2.2.1 Ethernet Interfaces

The Ethernet interfaces on the Centellis 2x00 User Card-10GE interface between the 10GBASE-BX4 Ethernet (XAUI) coming from the backplane fabric channel 1 and the 10GBASE-LRM Ethernet of the SFP+ module located on the front panel. The board uses an BCM8706 transceiver to support uplink functionality from the payload blade.

## 2.3 IPMC Controller

The IPMC Controller is derived from SMART EC's IPMC building block and it consists of two coupled micro controllers:

- IPMC Master Controller (IMC) based on an Atmega 256
- IPMC Slave Controller (ISC), based on an Atmega 168

### 2.3.1 IPMB0 Interface

IPMB0-A is connected to the I<sup>2</sup>C controller of the IMC, IPMB0-B to the I<sup>2</sup>C controller of the ISC. Both micro controllers have their own I<sup>2</sup>C controller and handle message transmission and reception independently, including bus error handling and bus arbitration.

Received messages sent to both the IMC and the ISC channels are collected by the IMC. The IMC dispatches messages which have to be sent either to its own I<sup>2</sup>C interface or to the ISC for transmission.

### 2.3.2 IPMC Standard Functions

The standard functionality of the SMART EC IPMC is available on the IPMC of the Centellis 2x00 User Card-10GE. For detailed information, see the *Centellis 2x00 User Card-10GE: Control via IPMI Programmer's Reference*.

## 2.4 Power Supply

The Centellis 2x00 User Card-10GE is powered by dual redundant -48VDC to -60VDC (rated voltage) from the backplane connector. The IPMC is powered by 3.4V from the shelf manager part of the board via the backplane.

The power supply of the shelf manager is compliant with the requirements of the PICMG 3.0 R3.0 (AdvancedTCA) specification. Each of the four power connections is separately fused. Fuse rating is 1A.

An EMI filter at the power input ensures conducted emission levels below EN 55022 class B.

### 2.4.1 On-board and External Supply

The Centellis 2x00 User Card-10GE has no provisions to switch off the power input. The board is powered whenever the power is attached to the Centellis 2x00 system (-40VDC to -72VDC).

The board satisfies the standby power limit of 10W for AdvancedTCA FRUs. Typical power consumption of the Centellis 2x00 User Card-10GE board is 2.8W.

### 2.4.2 Power Supply Holdup

The Centellis 2x00 User Card-10GE complies with the requirements for board level voltage transients as described in *chapter 4.1.4.3. of PICMG 3.0 (AdvancedTCA) specification*.

It satisfies the requirement of uninterrupted operation during a power failure of 5ms.

# 2.5 Installing and Removing SFP/ SFP+ Modules

This section describes how to install and remove SFP and SFP+ modules.



### Eye Damage

Optical SFP/SFP+ modules may emit laser radiation when no cable is connected.

Avoid staring into open apertures to avoid damage to your eyes.

### Personal Injury and Damage of the RTM and SFP/SFP+ Modules

Installing and using SFP/SFP+ modules which are not fully certified and which do not meet all relevant safety standards may damage the RTM and the SFP/SFP+ modules and may lead to personal injury.

Only use and install SFP/SFP+ modules which are fully certified and which meet all relevant safety standards.

### Personal Injury

Optical SFP/SFP+ modules may be classified as laser products. When installing and using any of these SFP/SFP+ modules, the regulations which correspond to the respective laser class apply to the whole RTM. Not complying to these regulations, may lead to personal injury.

When installing and using optical SFP/SFP+ modules which are classified as laser products, make sure to comply to the respective regulations.



SFP/SFP+ modules can be installed/removed both while the RTM is powered and non-powered. The presence and also the type of SFP/SFP+ modules is automatically detected.

The maximum power consumption of all installed SFP/SFP+ modules must not exceed 12 W.

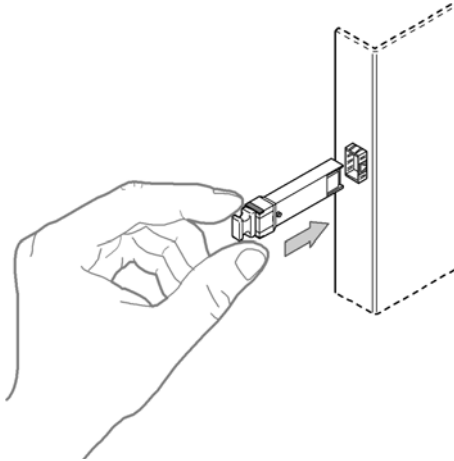
## 2.5.1 Installing an SFP/SFP+ Module

### Procedure

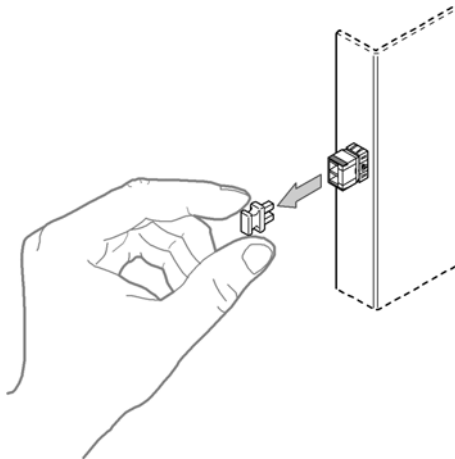
In order to install an SFP/SFP+ module, proceed as follows:



1. Slide the SFP/SFP+ module into the slot until it locks into position.



2. Remove the optical port plug.



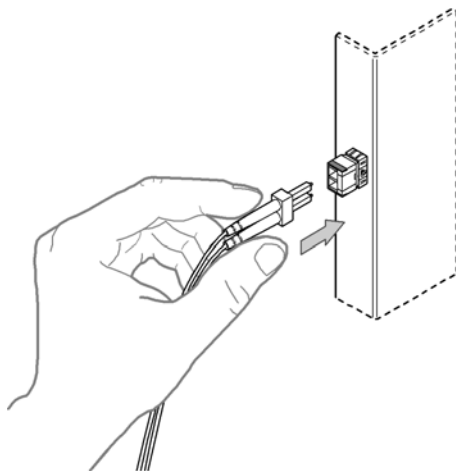
### NOTICE

#### SFP/SFP+ Module Damage

The optical port plug protects the sensitive optical fibers against dirt and damage. Dirt and damage can render the SFP/SFP+ module inoperable.

Only remove the optical plug when you are ready to connect a cable to the SFP/SFP+ module. When no cable is connected, cover the port with an optical port plug.

3. Connect the network cable to the SFP/SFP+ module.

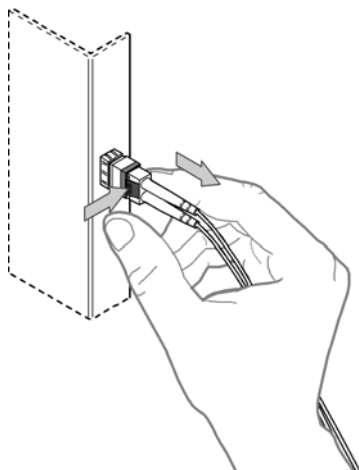


### 2.5.2 Removing an SFP/SFP+ Module

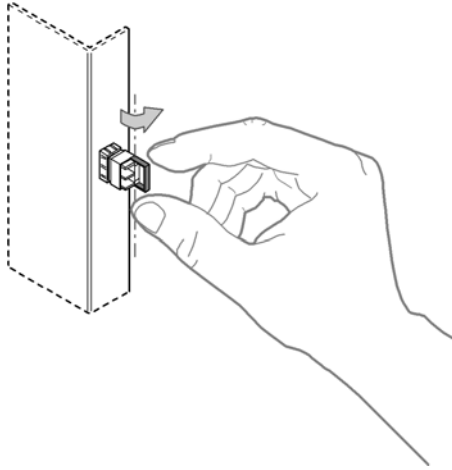
#### Procedure

In order to remove an SFP/SFP+ module, proceed as follows:

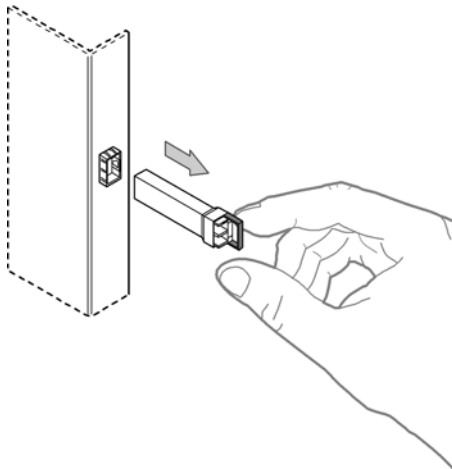
1. Remove any connected cable from the SFP module.



2. Open the SFP/SFP+ latch. Note that the latch mechanism of your SFP/SFP+ module may be slightly different compared to the latch shown in the following figure.



3. Grasp the SFP/SFP+ module and carefully slide it out of the slot.



4. Cover the optical port with the optical port plug.

### **NOTICE**

#### **SFP/SFP+ Module Damage**

**The optical port plug protects the sensitive optical fibres against dirt and damage. Dirt and damage can render the SFP/SFP+ module inoperable.**

**Only remove the optical plug when you are ready to connect a cable to the SFP/SFP+ module. When no cable is connected, cover the port with an optical port plug.**

## **2.6 Frame Ground and ESD**

Frame ground connection is provided by the backplane connector FrameGND.

The face plate mounting holes of the board are connected to frame ground.

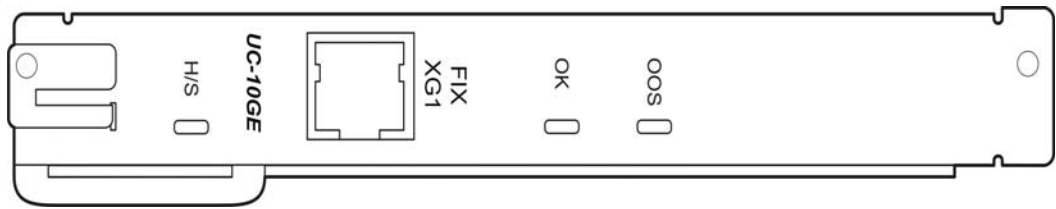
An ESD strip according to the AdvancedTCA specification PICMG 3.0 R3.0 is provided at one edge of the PCB.

# Controls, Indicators and Connectors

## 3.1 Face Plate

The following figure highlights the position of LEDs and connectors on the face plate of the board. The LEDs and connectors are described in the following sections.

Figure 3-1 Face Plate



### 3.1.1 LEDs

The following LEDs can be found on the face plate of the board. OOS, OK and H/S are ATCA LEDs and can be controlled via IPMI. For more information, see the *Centellis 2x00 User Card-10GE: Control via IPMI Programmer's Reference* manual.

Table 3-1 Face Plate LEDs

LED	Color	Description
OOS (failure)	Red	Red: The Centellis 2x00 User Card-10GE is out-of-service. Off: The Centellis 2x00 User Card-10GE is working properly.
OK (power)	Green	Green: The Centellis 2x00 User Card-10GE is operating properly. Off: Otherwise Blinking: The board boots up.
H/S	Blue	Blue: The Centellis 2x00 User Card-10GE is ready to be extracted. Off: The Centellis 2x00 User Card-10GE is not ready to be extracted. Do not remove the board during this state.

### 3.1.2 Ethernet Connectors

A SFP+ port located on the front panel allows for Ethernet connectivity from the payload to an external device.

### 3.2 Sensors

The IPMC functionality is based on the IPMI specification V1.5.

The IPMI sensors on the Centellis 2x00 User Card-10GE are shown [Table 3-2](#). For further information, see the *Centellis 2000 User Card-10 GE: Control via IPMI Programmer's Reference*.

*Table 3-2 Centellis 2x00 User Card-10GE Specific Sensors*

Sensor Name	Sensor Type Code Description	Generate Event	Event/ Reading Type Code
HotSwap HotSwap (F0h)	Hot swap sensor	Yes	Sensor specific (6Fh)
Ejector_State Button (14h)	Ejector state sensor		Sensor specific (6Fh)
IPMC_State OEM (D5h)	IPMC state OEM sensor		Sensor specific (6Fh)
IPMB0_State IPMB (F1h)	IPMB0 state sensor		Sensor specific (6Fh)
SFP_Enable Other FRU (1Ah)	Enable/Disable SFP Writable OEM sensor	No	Type enable (9)
SFP_TXDIS Other FRU (1Ah)	SFP TXDIS signal	Yes	Reading type failure (4)
SFP_LOS Other FRU (1Ah)	Loss of signal indication	Yes	Reading type failure (4)
SFP_TXFAULT Other FRU (1Ah)	SFP transmit fault	Yes	Reading type failure (4)
SFP_PRESENT Other FRU (1Ah)	SFP presence sensor	Yes	Presence (8)
PMD_LOSS_SIGNAL Monitor IC (26h)	Loss of signal indication	Yes	Reading type failure (4)
PMD_CMU_LOCK Monitor IC (26h)	PMD CMU Lock detect	Yes	Reading type failure (4)
PMD_LinkAlarm Monitor IC (26h)	Loss of signal indication	Yes	Reading Type failure (4)
PMD_CDR_LOCK Monitor IC (26h)	PMD CDR Lock detect	Yes	Reading type failure (4)

*Table 3-2 Centellis 2x00 User Card-10GE Specific Sensors (continued)*

<b>Sensor Name</b>	<b>Sensor Type Code Description</b>	<b>Generate Event</b>	<b>Event/ Reading Type Code</b>
VOLTAGE_1_0 Voltage (02h)	+1.0V sensor	Yes	Threshold (1)
VOLTAGE_3_3 Voltage (02h)	+3.3V sensor	Yes	Threshold (1)
VOLTAGE_3_3_MGMT Voltage (02h)	Management +3.3V sensor	Yes	Threshold (1)
VOLTAGE_5_0 Voltage (02h)	+5.0V sensor	Yes	Threshold (1)
TEMPERATURE0 Temperature (01h)	Temperature sensor 0	Yes	Threshold (1)
TEMPERATURE1 Temperature (01h)	Temperature sensor 2	Yes	Threshold (1)
SFP_TEMPERATURE Temperature (01h)	SFP Temperature sensor	Yes	Threshold (1)





# Board Exchange

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## 4.1 Introduction

This chapter describes how to install the Centellis 2x00 User Card-10GE board and includes the following information:

- Before installation
- Installing the board in a shelf
- Starting up the board
- Removing the board
- Operation



**The system is shipped with pre-installed Centellis 2x00 User Card-10GE boards. You have to observe the following procedures when ordering a board as a spare part or exchanging a board.**

## 4.2 Before Installation

This section provides the following information:

- Requirements
- Unpacking and inspecting the board

### 4.2.1 Requirements

Before you power up the board, calculate the power needed according to your system configuration.

#### 4.2.1.1 Environmental Requirements

You must make sure that the board when operated in your particular system configuration meets the environmental requirements specified below.



**Operating temperatures refer to the temperature of the air circulating around the board and not to the component temperature.**

### NOTICE

#### Board Damage

High humidity and condensation on the board surface causes short circuits.

Do not operate the board outside the specified environmental limits. Make sure the board is completely dry and there is no moisture on any surface before applying power.

Table 4-1 Environmental Requirements

Feature	Operating	Non-Operating (packed state)
Temperature	+5°C (+41°F) to +40°C (+104°F) (normal operation) according to NEBS Standard GR-63-CORE -5°C (+23°F) to + 55°C (+131°F) (exceptional operation) according to NEBS Standard GR-63-CORE	-40°C (-40°F) to +85°C (+185°F)
Temp. change	+/- 0.25°C/min according to NEBS Standard GR-63-CORE	+/- 0.25°C/min
Relative humidity	5% to 90% non-condensing according to SMART EC internal environmental requirements	5% to 95% non-condensing according to SMART EC internal environmental requirements
Vibration (tested in target platform)	0.1g from 5 to 100Hz and back to 5Hz at a rate of 0.1 octave/minute.	5-20Hz at 0.01g <sup>2</sup> /Hz 20-200Hz at -3.0dB/octave Random 5-20Hz at 1m <sup>2</sup> /Sec <sup>3</sup> Random 20-200Hz at -3dB/octave
Shock	Half-sine, 11mSec, 30m/Sec <sup>2</sup>	Blade level packaging Half-sine, 6mSec at 180m/Sec <sup>2</sup>
Free fall	-	200mm/all edges and corners 1.0 m (packaged) per ETSI 300 019-2-2 (Blade level packaging) 100mm (unpackaged) per GR-63-CORE

### 4.2.1.2 Power Requirements

Make sure that the board is used in Centellis 2x00 AdvancedTCA shelf. If the module is used in a Centellis 2x00 DC version shelf, make sure it is connected to -48VDC up to -60VDC (rated voltage), according to Telecommunication Network Voltage (TNV-2).

A TNV-2 circuit is a circuit whose normal operating voltages exceed the limits for a safety-extra-low-voltage (SELV) under normal operating conditions, and which is not subject to over voltages from telecommunication networks.

On-board voltages are 5.0VDC, 3.3VDC and 1.0VDC:

5.0V voltage is generated from the -48V AdvancedTCA power by a DC/DC converter with galvanic isolation suitable for TNV-2 circuits.

3.3V and 1.0V voltages are derived from the 5.0V power.

*Table 4-2 DC Board Power Requirements*

Feature	Value
Rated Voltage	-48VDC to -60VDC US and Canada: -48VDC
Operating Voltage	-39VDC to -72 VDC US and Canada: -39VDC to -60VDC
Input current	0.2A
Centellis 2x00 User Card-10GE power dissipation	3.8W maximum

The board provides two independent power inputs according to the AdvancedTCA specification. Each input has to be equipped with an additional fuse of max. 90A located either in the shelf where the board is installed or the power entry module (PEM).

### 4.2.1.3 Required Equipment

Gather the following equipment before starting:

- Screwdriver
- ESD wrist strap

### 4.2.2 Unpacking and Inspecting the Board

#### **NOTICE**

##### **Board Damage**

**Touching the board or electronic components in a non-ESD protected environment causes component and board damage.**

**Before touching boards or electronic components, make sure that you are working in an ESD-safe environment or wear ESD wrist straps.**

#### **Shipment Inspection**

To inspect the shipment, perform the following steps:

1. Verify that you have received all items of your shipment:
  - Printed Safety Notes
  - Centellis 2x00 User Card-10GE
  - Any optional items ordered
2. Check for damage and report any damage or differences to the customer service.
3. Remove the desiccant bag delivered together with the board and dispose of it according to your country's legislation.



**The board is thoroughly inspected before shipment. If any damage occurred during transportation or any items are missing, please contact our customer's service immediately.**

### 4.3 Installing the Board

Before starting to install the board, observe the following

#### **NOTICE**

##### **Board Damage**

**Touching the board or electronic components in a non-ESD protected environment causes component and board damage.**

**Before touching boards or electronic components, make sure that you are working in an ESD-safe environment or wear ESD wrist straps.**



**The board must only be operated in a shelf that is properly grounded.**

To install the board into an AdvancedTCA shelf, proceed as follows.

### Installation Procedure

The following procedure describes the installation of the board. It assumes that your system is powered. If your system is not powered, you can disregard the blue LED and thus skip the respective step. In this case it is a purely mechanical installation.

1. Put on an ESD wrist strap.
2. Connect the strap to the shelf by attaching the front or rear ESD jack /ESD snap.
3. Insert the board into the shelf by placing the left and right edges of the board in the card guides of the shelf. Ensure that the guiding module of shelf and board are aligned properly. The alignment pin facilitates the insertion and prevents bent pins.
4. Slide the board into the shelf by using the extraction handles until you feel resistance.
5. Wait until the blue LED is illuminated.
6. Tighten the screws on the left and on the right of the board.  
In this way the handle switch activator is closed and the board can be powered. The blue LED blinks.
7. Wait until the blue LED is switched off.  
The switched off blue LED indicates that the board is activated.
8. Attach cables to the front panel connectors as necessary.

## 4.4 Removing the Board

This section describes how to remove the board from an AdvancedTCA system.

### Removal Procedure

The following procedure describes how to remove the board from a system. It assumes that the system is powered. If the system is not powered, you can disregard the blue LED and thus skip the respective step. In that case it is a purely mechanical procedure.

1. To extract the active shelf manager initiate a switchover. Otherwise continue with the next step.
2. Put on an ESD wrist strap.
3. Connect the strap to the shelf by attaching it to the front or rear ESD jack /ESD snap.

## Board Exchange

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4. Remove any cables that are attached to front panel connectors.
5. Unfasten the screws of the face plate until the handle is detached from the front panel of the board.  
The handle switch activator triggers the blinking of the blue LED. The hotswap state remains in the state "extraction pending", so that the blue LED is still blinking.
6. Wait until the blue LED is illuminated.
7. Remove the board from the shelf using the extraction handles.

# Related Documentation

## A.1 SMART Embedded Computing Documentation

The documentation listed is referenced in this manual. Technical documentation can be found by using the Documentation Search at <https://www.smartembedded.com/ec/support/> or you can obtain electronic copies of SMART EC documentation by contacting your local sales representative.

*Table A-1 SMART EC Documentation*

Document Title	Publication Number
Centellis 2100 Data Sheet	Centellis 2100 DS
Centellis 2000 Data Sheet	Centellis 2000 DS
Centellis 2000 DC Release 1.2 Installation and Use	6806800J13
Centellis 2000 AC Installation and Use	6806800J87
Centellis 2x00 User Card-10GE: Control via IPMI Programmer's Reference	6806800K89
System Management Interface Based on HPI-B (Centellis 2000/2100/4411) User's Guide	6806800P20

## A.2 Related Specifications

For additional information, refer to the following table for related specifications. As an additional help, a source for the listed document is provided. Please note that, while these sources have been verified, the information is subject to change without notice.

*Table A-2 Related Specifications*

Organization	Document Title
Intel <a href="http://developer.intel.com/design/servers/ipmi/">http://developer.intel.com/design/servers/ipmi/</a>	Platform Management FRU Information Storage Definition v1.0 IPMI Specification v1.5
PICMG <a href="http://www.picmg.org">http://www.picmg.org</a>	PICMG 3.0 Revision 3.0 Advanced TCA Base Specification
Service Availability Forum <a href="http://www.saforum.org">http://www.saforum.org</a>	Service Availability Forum Hardware Platform Interface SAI-HPI-A01.01







