FMC-4000 FLIGHT AND MISSION COMPUTER FAMILY

Stay one step ahead.

The Rockwell Collins FMC-4000 series of flight and mission computers integrates increasingly sophisticated technological capabilities across a wide range of today's military aircraft. It also delivers low size, weight, power consumption and cost (SWaP-C), along with easy future upgradability that keeps the system at the cutting edge. All with our proven expertise as one of the largest suppliers of mission computers for Eurofighter.

Rockwell Collins

Building trust every day

High flexibility, adaptability and scalability – without high costs.

Keeps you on mission and on budget.

With an increasing sophistication of flight missions combined with tighter budgetary restrictions, today's military is placing more demand on avionics systems to deliver higher performance, functionality, reliability and efficiency while decreasing SWaP-C.

Most existing aircraft computing platforms can only partially address these requirements. The lack of affordable adaptability and scalability often creates a high modification effort and long turnaround times until first entry to service.

The FMC-4000 computer family from Rockwell Collins meets these demands with a highly flexible and cost-effective design approach that ensures your platform maintains the latest technology throughout its life cycle. Whether that platform is military fixed wing aircraft, rotary wing, fighter aircraft, unmanned aerial systems or ground stations, the FMC-4000 series delivers the capability you need.

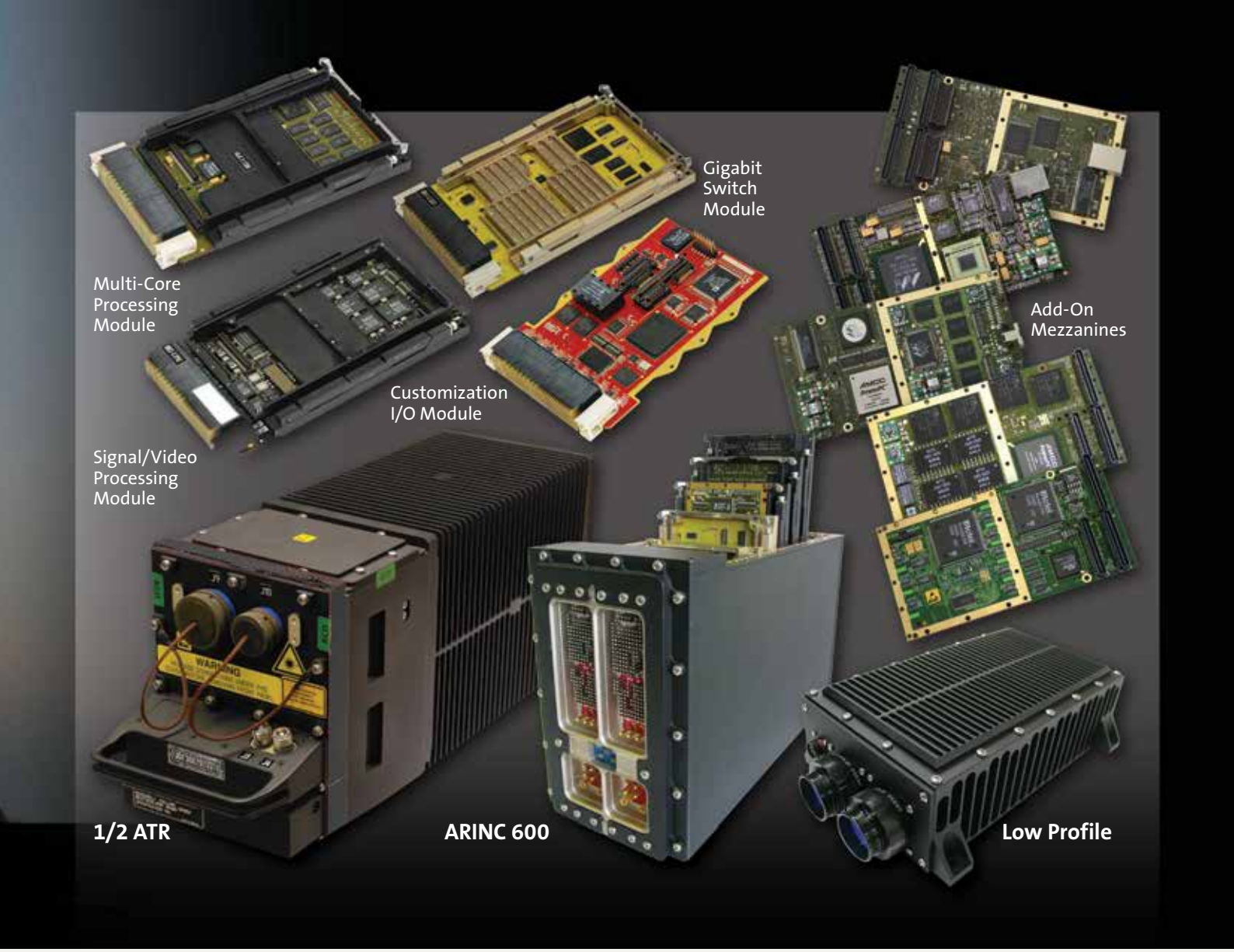
Open architecture, open options.

Based on a common core approach using open architecture VPX technology ruggedized for harsh environmental conditions, the FMC-4000 offers avionics subsystems with maximized component re-use and minimized development and integration risk.

This approach provides for considerable synergies in development, production and logistics for implementation speed and cost effectiveness. Its flexibility enables repackaging to various board formats as well as third-party integration capability. And because the FMC-4000 incorporates a variety of real-time operating systems, it will run all your OEM-developed software applications.

The FMC-4000 computer series offers implementations for various enclosure types, including ATR, ARINC-600 and low-profile housings, making use of the same common core building blocks.

Our open architecture also features improved obsolescence robustness to help keep the system at high performance throughout its life cycle.



Typical FMC-4000 applications

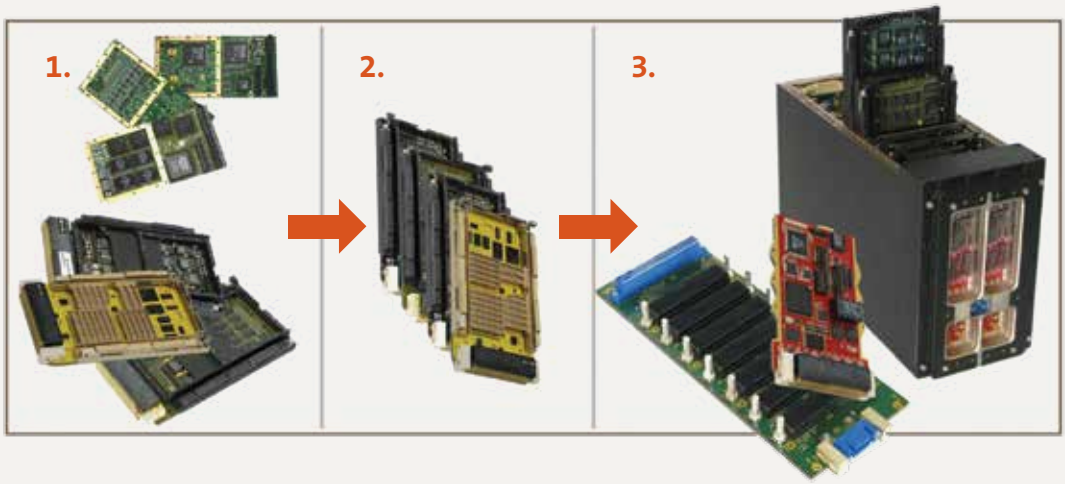
- Mission and payload management
- Communication servers
- Gigabit Ethernet Switch
- Datalink processors
- Enhanced video processing solutions
- Data and video recorders
- Data concentrator units

Typical FMC-4000 interfaces

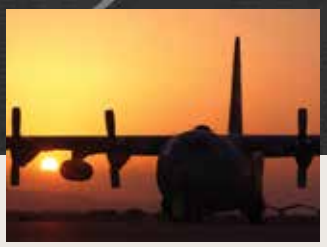
- Gigabit Ethernet
- ARINC 429
- ARINC 743A GPS time mark
- USB
- 10 Gigabit Ethernet XAUI uplink
- 28VDC-, TTL-, optocoupled discrete
- Analog video (STANAG 3350-A/B/C)
- Digital video (3G/HD/SD-SDI, HDMI, DVI, eDP)
- MIL-STD-1553B
- Stereo audio
- RS485/423/422/232
- eSATA

FMC-4000 common core approach

1. Common modules
2. Common computing core
3. Application specific flexible I/O and multiple enclosures



Speed, performance and optimization that will leave you pinned to your seat backs.





Distinctive FMC-4000 features at a glance.

ITAR free.

The FMC-4000 series is an International Traffic in Arms Regulations (ITAR)-free European product that has no restrictions under U.S. ITAR.

Highly flexible and adaptable.

Specify required input/output and we can tailor a solution using the FMC-4000's flexible customization compartments.

Choose from a variety of enclosures, including ATR, ARINC 600 and low profile.

We offer the highest level of integration and system-on-chip design.

Multi-core processing.

Includes dual-core, quad-core, octal-core and many-core processors, with scalable performance and cost. As technology advances, we can provide you with seamless integration of the latest multi-core processors and third-party COTS processor modules like low-power Intel® Atom™ or x86 Intel Core™ i7.

High-definition (HD) video processing and compression.

HD video/image/signal processing and compression are done through hardware only – no software involved – for the highest level of hardware-accelerated parallelization at lower cost. The system offers scalable HD-serial digital interface video processing as well as H.264 compression and decompression.

FMC-4000 Processor Roadmap

• PowerPC 7448 • PowerPC 750FX	• Dual Core 8572E • Low Power 8315E	• Quad Core • Octal Core	• Multi and Many Core

C-130 Hercules sunset photo used courtesy of the United States Air Force.

Other features include:

- Verified ready-to-use, field-programmable gate array environment using pre-floorplanned netlists
- Low latency intra-frame and inter-frame encoding
- User-specific content in DSP chains via model-based flow support

High-speed communication.

Gain superior internal bandwidth and multi-gigabit point-to-point backplane channels with the FMC-4000, as well as state-of-the-art interfaces such as GEth, PCI Express and Serial RapidIO.

Gigabit Ethernet switching.

Provides internal and external Gigabit Ethernet switching capability. The FMC-4000 series also offers a 10-gigabit uplink option.

Multiple operating system options.

Currently supports optional commercial-off-the-shelf, real-time operating systems such as VxWorks-653, Green Hills® Software INTEGRITY® and LynxOS®. Other options, including PikeOS®, Microsoft® Windows® 7 and XP-embedded could be made available on request.

FMC-4000

Rockwell Collins computer family

FMC-4000 COMMON CORE CARDS

- HPX3-1400
  - Quad-Core PPC @ 4x 1.5 GHz
- HPX3-1200
  - Dual-Core PPC @ 2x 1.3 GHz
- HPX3-1100
  - PowerPC 7448 @ 1.4 GHz
- EXX3-1100
  - 24-port L2/L3 GEth switch
- SPX3-1200
  - HW-accelerated signal processing
- IOX3-1100
  - PowerPC 8315E @ 600 MHz

FMC-4000 CUSTOMIZED I/O CARDS

- CIO1-1000 GEth, ARINC 429, discretes
- CIO2-1000 GEth, HD and analog video, IRIG-B, audio
- CIO3-1000 Embedded GEth switch, HD and analog video
- CIO4-1000 Embedded GEth switch, HD and analog video, ARINC 429, 3x MIL-STD-1553B, audio, XMC/PMC carrier

FMC-4000 ENCLOSURES, PSU

- ARINC 600 enclosure
- Low profile enclosure (2-slot and 3-slot enclosures)
- ATR enclosure
- 28 VDC/115 VAC PSU

FMC-4000 MEZZANINES

- MBMP-110x Quad MIL-STD-1553B
- ARMP-2000 ARINC 429, discretes
- SPMX-1000 Signal/video processing
- Add-on PMC/XMC
  - ASL SmartNode
  - AFDX End System

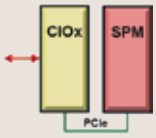
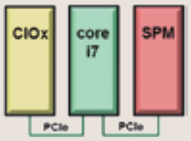
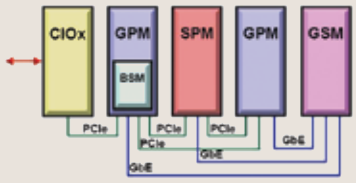
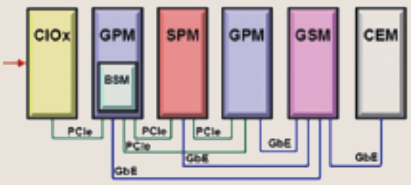
THIRD PARTY COMPONENTS

- SATA SSD
- x86 Intel Atom CPR
- x86 Intel i7 Dual-/Quad-Core
- Interfacing mezzanines
- Bulk storage

FMC-4000 SUPPORT COMPONENTS

- ACAX-1000 ARINC 600 breakout panel
- SGMII2ETH SGMII to Gigabit Ethernet adapter
- Evaluation rack 4x 3U VPX rack
- TSBX-1000 3U VPX development backplane
- TSX3-1000 3U VPX test module

Typical system configurations.

FMC-4000 family	Representative configuration
FMC-4200 series › Low profile enclosure › 2-slot VPX backplane › MIL-STD-38999 compatible connectors › Integrated 28 VDC PSU, 100W max 	**Standalone GEth switch** › GEth switch module with up to 22x GEth interfaces › Up to 2x 10GEth Uplinks  **Video/signal processing and compression** › Hardware accelerated video/image/signal processing and compression module › GEth VoIP streaming, 3G/SD-HD SDI digital video, STANAG 3350 A/B/C analog video, stereo audio 
FMC-4300 series › Low profile enclosure › 3-slot VPX backplane › MIL-STD-38999 compatible connectors › Integrated 28 VDC PSU, 100W max 	**Datalink processor/mission computer** › x86 or PPC processor module › Hardware accelerated video/image/ signal processing and compression module › Embedded GEth switch, 3G/SD-HD SDI digital video, STANAG 3350 A/B/C analog video, stereo audio, MIL-STD-1553B, ARINC 429, RS485/422/232, USB 2.0 
FMC-4700/4900 series › ARINC 600 enclosure, e.g., 4 MCU short › 7-slot/9-slot backplane › ARINC Type 1-3 equipment connector › 28 VDC or 115 VAC PSU, 250W max › Forced air cooling 	**Mission computer for airborne applications** › Dual/quad core PPC processing modules › Hardware accelerated video/ image/signal processing and compression module › GEth switch module with up to 22x GEth interfaces  › Up to 2x 10 GEth uplinks › Bulk storage mezzanine for data storage › 3G/SD-HD SDI digital video, STANAG 3350 A/B/C analog video, stereo audio, MIL-STD-1553B, ARINC 429, RS485/422, USB 2.0
FMC-4600 series › ATR compliant enclosure (1/2 ATR short) › 6-slot backplane › EF equipment connector › 28 VDC or 115 VAC PSU, 250W max › Forced air cooling 	**ATR high-end fighter mission computer** › Dual/quad core PPC processing modules › Hardware accelerated video/image/signal processing and compression module  › GEth switch module with up to 22x GEth interfaces › Up to 2x 10 GEth uplinks › Common EFABUS express module › Bulk storage mezzanine for data storage › 3G/SD-HD SDI digital video, STANAG 3350 A/B/C analog video, stereo audio, MIL-STD-1553B, STANAG 3910, ARINC 429, RS485/ 422, USB 2.0

Customize your system with a wide range of components and configurations.

The FMC-4000's scalable, modular configurability enables you to choose a computing platform that accommodates your needs, today and well into the future.

You'll have the flexibility and efficiency of creating new configurations using the same hardware – with small, midsize or large module slots – on the same platform. We can also offer simplified customization of interfaces, functionality and performance to keep your platform-to-platform adaptation costs low.

All components in the series are highly rugged, with optimized thermal, mechanical and volume parameters. They stand up to gunfire vibration, high heat and other extreme operating conditions of the military and civil environment.

System components.

- Enclosures
- Processing modules, including signal and video processing
- Gigabit Ethernet switch
- VPX backplanes
- Power supplies
- Input/output interfaces
- Third-party modules
- Real-time operating systems

Global capabilities. Global support.

As a Rockwell Collins customer, you can count on optimal, seamless and tailored support throughout your aircraft's life cycle. We offer 24/7 global service and support capability, with more than 80 worldwide locations and more than 3,200 dedicated employees. We'll work with you in a customer-focused spirit of collaboration to help you advance your goals.

FMC-4000 – ENVIRONMENTAL COMPLIANCE

Temperature range	-40°C to +70°C operating, -55°C to +85°C storage
Electrical power	MIL-STD-704F
Electromagnetic interference	MIL-HDBK-461F
Temperature	MIL-STD-810F
Rain	MIL-STD-810F, Method 506.4, Procedure III – Drip
Humidity	MIL-STD-810F, Method 507.4, 95 percent RH
Salt-spray/fog	MIL-STD-810F, Method 509.4
Sand/dust	MIL-STD-810F, Method 510.4, Procedure I and II
Explosive atmosphere	MIL-STD-810F, Method 511.4, Procedure I
Sine-on-random	MIL-STD-810F, Method 514.5, Procedure I, Category 14 Helicopter
Shock, operational	MIL-STD-810F, Method 516.5, Procedure I, 40G, 11ms
Shock, crash safety	MIL-STD-810F, Method 516.5, Procedure V
Gunfire vibration	MIL-STD-810F, Method 519.5, Procedure I, Category 8
Altitude	MIL-STD-810F
Vibration	MIL-STD-810F

FMC-4000 COMPONENTS – MECHANICAL CHARACTERISTICS

Ruggedized design for military applications	
Complies with conduction-cooled specification (VITA 48.2)	
Form factor	3U VPX (VITA 46)
Size	100 mm x 160 mm

POWER SUPPLY CAPABILITIES

- PSUs designed for up to 50 ms hold-up time per MIL-STD-704A
- 28 VDC and/or 115 VAC system power

COMMERCIAL STATE-OF-THE-ART STANDARDS

VITA 20-2001 (R2005)	Conduction cooled PMC
VITA 32-2003	Processor PMC
VITA 39-2003	PCI-X for PMC and Processor PMC
VITA 42.0	XMC
VITA 42.3	XMC PCI express
VITA 46.0	VPX base standard
VITA 46.3	Serial RapidIO on VPX fabric connector
VITA 46.4	PCI express on VPX fabric connector
VITA 46.7	Ethernet on VPX fabric connector
VITA 46.9	PMC-XMC Ethernet signal mapping to 3U6U on VPX User IO
VITA 46.10	Rear transition module for VPX
VITA 46.11	System management on VPX
VITA 46.20	VPX switch slot definition
VITA 48.0	Ruggedized Enhanced Design Implementation (REDI)
VITA 48.1	REDI air cooling applied to VITA 46
VITA 48.2	REDI conduction cooling applied to VITA 46
VITA 57	FPGA Mezzanine Card (FMC) draft standard
IEEE Std. 1101.2	Standard for mechanical core specifications for conduction-cooled Eurocards
IEEE P1386-2001	Standard for a common mezzanine card family
IEEE P1386.1-2001	Standard physical and environmental layers for PCI mezzanine cards
IEEE Std. 802.3	Ethernet standards
IEEE Std. 1588	Standard for a precision clock synchronization protocol

Building trust every day.

Rockwell Collins delivers smart communication and aviation electronic solutions to customers worldwide. Backed by a global network of service and support, we stand committed to putting technology and practical innovation to work for you whenever and wherever you need us. In this way, working together, we build trust. Every day.

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