OpenVPX Backplanes

Backplane Know-how for superior signal integrity

OpenVPX (VITA 65) has opened up new definitions for VPX backplanes and systems. This includes defined module, slot and backplane profiles, as well as high speed fabric options, control planes and secondary expansion fabrics. Elma, as founding and active member of the OpenVPX initiative, offers a comprehensive portfolio of OpenVPX backplanes and chassis, designed to meet almost any application you need. In the following paragraphs we will provide an overview of the various elements and terms involved, as well as explanations about their utility.

OpenVPX defines an easier way to ensure the Interoperability between the VPX Modules from different vendors, but also the compatibility between certain Slot configurations with similar VPX Modules.

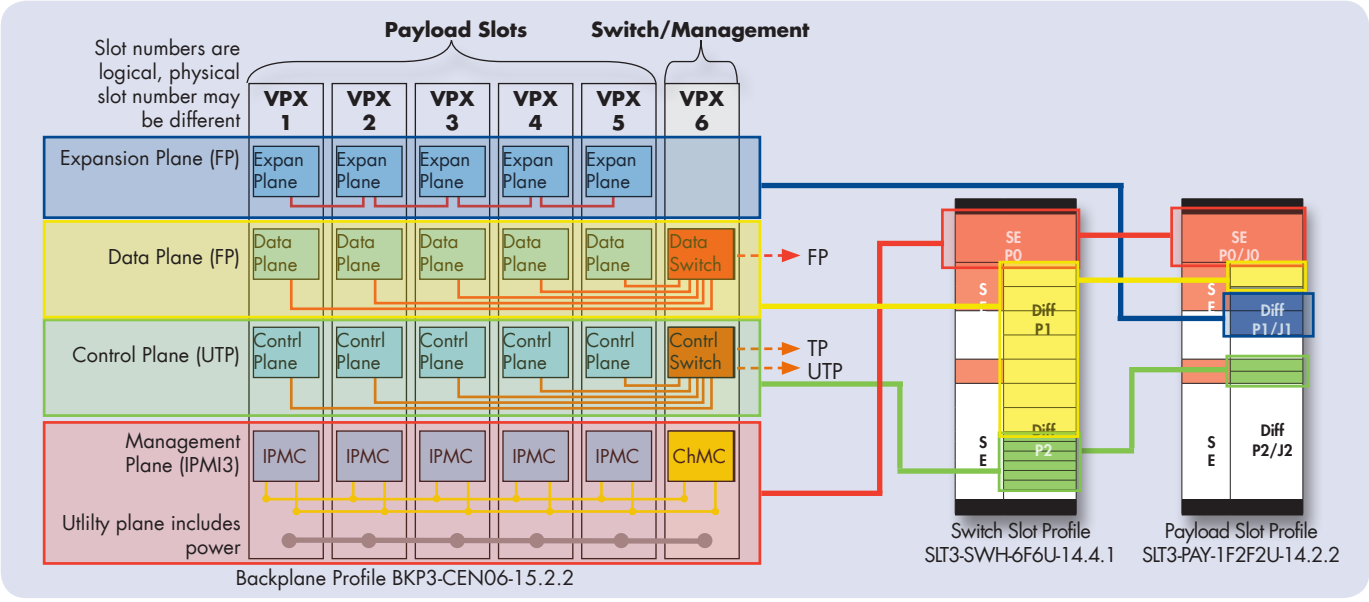
Due to the new OpenVPX (VITA 65) specification, the different backplane configurations have been reduced to the minimum. Nevertheless the Backplane Profiles are giving clear information about the data rate, routing and fabric topology that can be used on the backplane.

Types of fabric channels

The OpenVPX (VITA 65) system specification is the first VPX specification dedicated to the Interoperability of multivendor system and subsystem blocks. OpenVPX introduces new concepts such as module, slot and backplane profiles, which are achieving the main goal, the Interoperability, by defining unique topologies for interconnecting modules. The fundamental profile is the slot profile, which has basic definitions of planes: type, number, size and user-defined pins. The slot profile is the physical connection basis of module to module interoperability.

The backplane profile defines how slot profiles are connected. The 3U backplane profile BKP3-CEN06-15.2.2 and its corresponding 3U slot profiles (two in this case) in the figure below, show an example of the interconnectivity on an OpenVPX backplane. The physical and logical interconnection path, used for the transfer of the information between the modules, is called Plane. The following Planes are predefined by OpenVPX:

- The Utility and Management Planes (marked red): power, clock and reset connections are part of the utility plane, since the management plane is used to monitor, manage and diagnose the health of the system.
- The Data Plane (marked yellow) is used for the application and external data traffic. It provides a dedicated hi-speed path between the processing modules.
- The Control Plane (marked green) defines a communication path for controls traffic.
- The Expansion Plane (marked blue) provides an extra transferring path between different specific entities within a system.

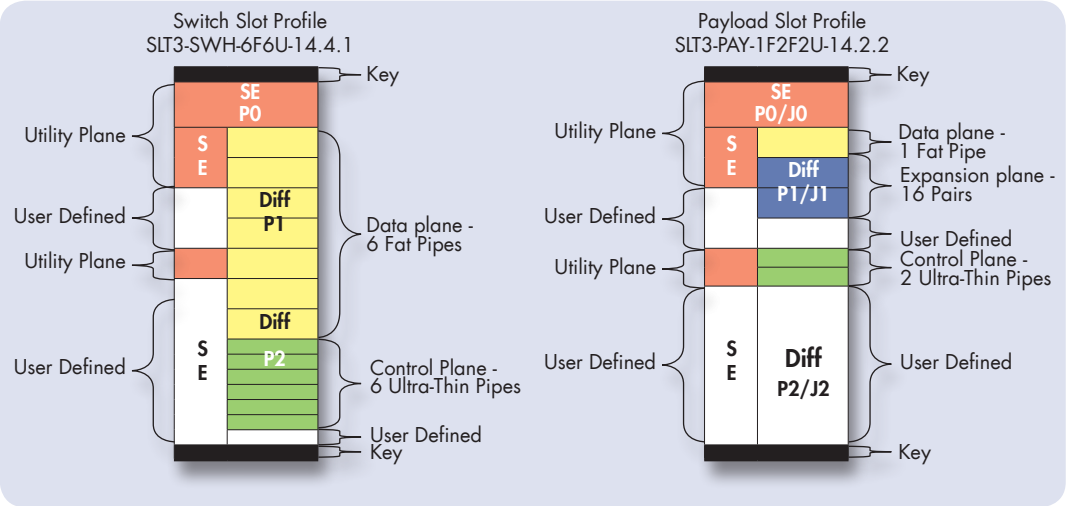


Backplane Profile BKP3-CEN06-15.2.2

Additionally to the planes, most slot profiles are reserving pins for the custom purposes. These are the User-defined pins which connect through the backplane from the front module to the rear transition module (RTM), without having any slot-to-slot connection on the backplane. The VPX module developer could use these user-defined pins for any purpose without worrying about interoperability with other modules.

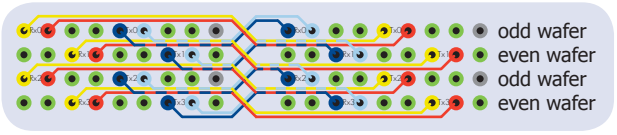
OpenVPX Backplanes

Looking deeper into the plane description of a certain backplane or slot profile, it can be seen that each data, expansion and control plane uses different wide signal links, depending on the needed bandwidth.



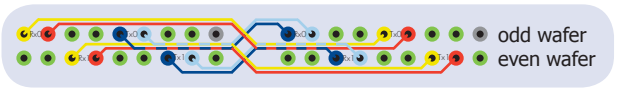
Types of Signal Channels

OpenVPX defines a pipe as a connection made up of differential pairs. The wider bands like Fat Pipes (FP) are typically used in the Data Plane, while the Control Plane will often have Thin Pipes (TP) or Ultra Thin Pipes (UTP).



Fat Pipe (FP) or "x4": A channel comprised of four lanes, 4 x Tx pairs + 4 x Rx pairs → 25 GBaud capable.

PCIe-x4, sRIO-x4, Infiniband-x4, 10GBase-KX4, 10GBase-BX4, 10GBase-T



Thin Pipe (TP) or "x2": A channel comprised of two lanes, 2 x Tx pairs + 2 x Rx pairs → 12.5 GBaud capable.

PCIe-x2, sRIO-x2, Infiniband-x2, 1000Base-T

Ultra-thin Pipe (UTP) or "x1": A channel comprised of one lane, 1 x Tx pair + 1 x Rx pair → 6.25 GBaud capable.

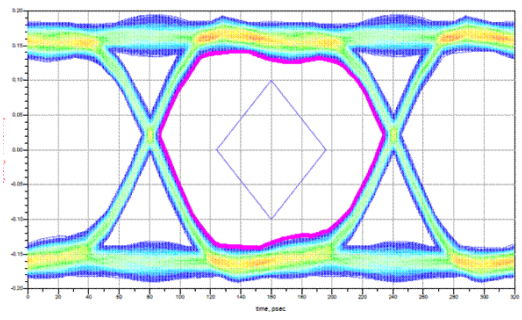
PCIe-x1, sRIO-x1, Infiniband-x1, 1000Base-KX/BX

ELMA OpenVPX backplanes with superior signal integrity

ELMA OpenVPX Backplanes provide high-speed serial fabrics, supporting flexible topologies (e.g. central switch or distributed), keeping the compatibility with multiple protocols.

Dielectric loss, skin-effects stub-effect or x-talk – the highly complex structure of a backplane can cause many undesirable effects which negatively influence signal integrity. Only with in-depth technical expertise and appropriate simulation and measurement technology it is possible to find the best solution and harmonize the different components of the backplane. This especially applies when having high packing density. ELMA is here just the perfect partner.

Many of our solution processes derive directly from internal know-how. The result is a product quality which regularly wins the comparison with competitive products.



OpenVPX Backplanes

OpenVPX backplane list and configuration sheet

3U Backplanes

Slots	Topology	Backplane Profile	Payload	Switch	VITA 67 I/O	Peripheral	ELMA Germany Part Number
2	Distributed	BKP3-DIS02-15.2.8-n	1	-	-	1	65d302-1528-30
3	Centralised	BKP3-CEN03-15.2.9-n	1	-	-	2	65c303-1529-30
5	Distributed	BKP3-DIS05-15.2.13-n	1	-	-	4	65d305-15213-30
5	Distributed	BKP3-DIS05-15.3.2-n	2	-	3	-	65d305-1532-30
5	Centralised	BKP3-CEN05-15.3.3-n	2	1	2	-	65c305-1533-30
6	Centralised	BKP3-CEN06-15.2.2-n	5	1	-	-	65c306-1522-30
6	Distributed	BKP3-DIS06-15.2.7-n	5	1	-	-	65d306-1527-30
6	Centralised	BKP3-CEN06-15.2.10-n	1	-	-	5	65c306-15210-30
6	Centralised	BKP3-CEN06-15.2.12-n	1	1	-	4	65c306-15212-30
6	Distributed	BKP3-DIS06-15.2.14-n	5	1	-	-	65d306-15214-30
7	Centralised	BKP3-CEN07-15.2.3-n	6	1	-	-	65c307-1523-30
8	Centralised	BKP3-CEN08-15.2.15-n	6	2	-	-	65c308-15215-30
8	Centralised	BKP3-CEN08-15.2.16-n	6	2	-	-	65c308-15216-30
9	Centralised	BKP3-CEN09-15.2.11-n	1	-	-	8	65c309-15211-30
9	Centralised	BKP3-CEN09-15.2.17-n	8	1	-	-	65c309-15217-30
10	Centralised	BKP3-CEN10-15.2.4-n	8	2	-	-	65c310-1524-30
10	Centralised	BKP3-CEN10-15.2.5-n	8	2	-	-	65c310-1525-30
12	Centralised	BKP3-CEN12-15.2.6-n	10	2	-	-	65c312-1526-30

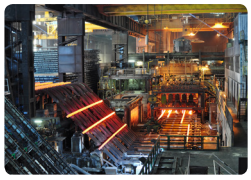
6U Backplanes

Slots	Topology	Backplane Profile	Payload	Switch	Peripheral	VME Bridge	VME	Elma Germany Part Number
5	Centralised	BKP6-CEN05-11.2.5-n	4	1				65c605-1125-30
5	Distributed	BKP6-DIS05-11.2.16-n	5					65d605-11216-30
6	Centralised	BKP6-CEN06-11.2.8-n	5	1				65c606-1128-30
6	Distributed	BKP6-DIS06-11.2.10-n	5	1				65d606-11210-30
6	Centralised	BKP6-CEN06-11.2.14-n	1		5			65c606-11214-30
6	Distributed	BKP6-DIS06-11.2.15-n	5	1				65d606-11215-30
6	Distributed	BKP6-DIS06-11.2.18-n	6					65d606-11218-30
7	Hybrid	BKP6-HYB07-11.2.20-n	3			2	2	65h607-11220-30
8	Hybrid	BKP6-HYB08-11.2.12-n	1		3	1	3	65h608-11212-30
9	Centralised	BKP6-CEN09-11.2.13-n	1		8			65c609-11213-30
9	Distributed	BKP6-DIS09-11.2.19-n	9					65d609-11219-30
10	Centralised	BKP6-CEN10-11.2.4-n	9	1				65c610-1124-30
10	Centralised	BKP6-CEN10-11.2.7-n	8	2				65c610-1127-30
10	Centralised	BKP6-CEN10-11.2.6-n	8	2				65c610-1126-30
12	Centralised	BKP6-CEN12-11.2.9-n	10	2				65c612-1129-30
16	Centralised	BKP6-CEN16-11.2.2-n	14	2				65c616-1122-30
16	Centralised	BKP6-CEN16-11.2.17-n	14	2				65c616-11217-30
17	Hybrid	BKP6-HYB17-11.2.11-n	12	3			3	65h617-11211-30
20	Centralised	BKP6-CEN20-11.2.3-n	18	2				65c620-1123-30

Backplanes

TECHNOLOGY FLASH

Elma. **The backplane is just the beginning.**



Since more than two decades, ELMA has developed and produced reliable system solutions for aviation, telecommunication, military, industry, medicine and research. ELMA offers thought-out cooling concepts and highest signal quality.
We guarantee for functionality even under most difficult conditions. And we are prepared for the next project – your project.

Proven know-how

Test series for air flow, temperature and the cooling of components, boards and complete systems enable us to develop favorably-priced products. The FloTHERM®-simulation method for example enables our engineers to create virtual models, carry out thermal analyses and quickly and easily test design correction measures. And all this is done even before the first prototype has been built.

The shortest route from idea to reality

ELMA is specialized on speed. But this not only applies for our know-how in the high-speed backplanes segment. We also control speed when it comes to product availability. Whether standard version or customized – ELMA stands for short manufacturing times combined with highest quality demands.

Unsure which technology to choose? We will be glad to advise you.

An active member in the PICMG® and VITA working groups, we have the overview needed to advise you on all important decisions relating to your project.

ELMA - Your Solution Partner is strong in:

- Components
- Enclosures & Cabinets
- Small Form Factor
- Rotary Switches
- Backplanes
- Electronic Manufacturing Services
- System Platforms