Custom Ethernet Switches
Technology Brief

Ethernet technology is used almost everywhere. You will find it for example in internet access routers at home, in every datacenter rack and in high speed backbones of telecom networks.

Obviously, the requirements for the different segments vary, but for many industry segments the requirements are generic enough to allow the use of commercial off-the-shelf equipment.

However, for some target applications the requirements are so specific that no generic solution can be used.

An Ethernet switch can also be needed as part of a larger system, for example as a slide-in card or a backplane, to enable Ethernet communication both inside and outside of the system.

For such integrated cards, there are usually specific requirements on form factor, connector types and configuration.

Sectors with specific requirements

- **Transportation**
  Form factor, safety, shock and vibration and environmental conditions.
- **Aviation**
  Lifetime, reliability and traceability.
- **Defense**
  Connector types, reliability and component selection.

“Today, we continued by performing some tests in the EMI chamber. Numerous sweeps were performed (100-200Mhz, 200-800Mhz, 800Mhz - 6Ghz), and we had an extremely satisfying result (Quote of a bystander: "what? that is without a housing? How is that possible?"). Basically, the bare PCB setup passed all DO160G emission tests by itself . .....The lab engineer tipped his hat to your excellent EMI design.”

Customer Feedback
Leading manufacturer of inflight entertainment systems in aerospace sector.

AimValley
Utrechtseweg 38
1213 TV Hilversum
The Netherlands
phone +31 35 689 1900
sales@aimvalley.com
www.aimvalley.com

Custom Ethernet Switches
Technology Brief

Custom Ethernet Switch Development

A custom Ethernet Switch development usually runs through the following phases:

Architecture phase
Defines the key requirements, like number of interfaces, use of Power Over Ethernet (PoE), environmental conditions and required certification. Also the selection of the silicon (e.g. Broadcom, Marvell, Microsemi or FPGA based) and the software stack (e.g. AimOS or SONIC) are part of this phase.

Design phase
Create the schematics of the switch and continue with the layout. Configure the software stack for use on the hardware and develop new parts, e.g. a custom graphical user interface. Design the mechanics such as: housing and PCB outline for the new switch.

Certification phase.
Samples of the product are provided to an accredited test house to certify the switch against specific industry standards. Certification can include: CE, UL/CSA, FDA laser safety, IEC62368 product safety, NEBS (GR-63) and NAVMAT B-1 shock and vibration.

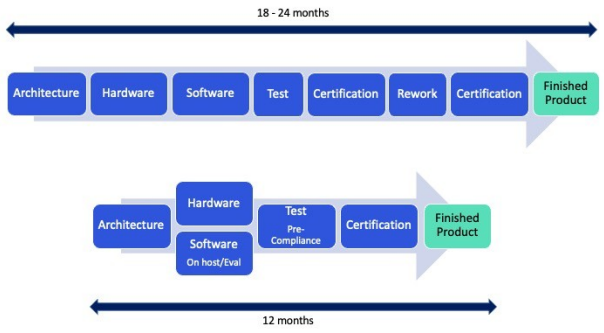
Testing phase.
Create a test plan based on the requirements for the switch and verify hardware, software and system behavior. Because a custom Ethernet switch typically has a non-standard interface it is important to do Ethernet Compliance testing on all interfaces using dedicated test sets. Also pre-certification testing may be needed to prepare for the next phase of formal certification, which is costly and therefore should ideally pass the first time.

Deployment phase.
During deployment, production needs to be monitored to maintain product quality. Field returns are investigated to detect potential design or component issues. To prevent sudden end-of-life of critical parts, a second source supplier is already identified during the design phase. Alternatively a small redesign is necessary.

Typical development cycles are 12 to 24 months. Actual duration depends on the possibility to start software development and test before the actual hardware development is completed.

The use of a host environment, which allows testing most functionalities on a standard PC or workstation, or an evaluation board, which has enough commonality with the custom hardware to start software development, are key to shorten the development cycle.

It is also important to start the design process with the certification requirements in mind. This prevents failures during the final certification test which may lead to starting the design process all over again.



Development Process: optimized versus standard practice

AimValley
Utrechtseweg 38
1213 TV Hilversum
The Netherlands
phone +31 35 689 1900
sales@aimvalley.com
www.aimvalley.com

Custom Ethernet Switches
Technology Brief

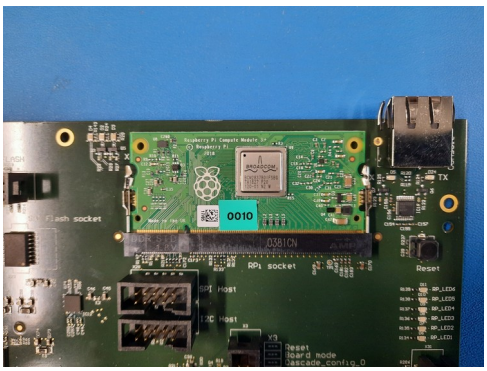
AimValley Expertise

During all steps of the development of a custom Ethernet switch you can rely on AimValley to support you. Our team of engineers has extensive experience in building custom solutions and has mastered a number of key technologies, like:

- Hardware design for Ethernet interfaces, ranging from 10 Mbit/s Single Pair Ethernet to 800 Gbs using PAM4 and QSFPDD.
- Power over Ethernet (POE) design.
- Design for certifications like CE, UL/CSA, FDA laser safety, IEC62368 product safety, NEBS (GR-63) and NAVMAT B-1 shock and vibration.
- AimOS, an Ethernet software stack, or Network Operating System with Layer 2 and Layer 3 protocols, supporting o.a. Broadcom silicon.
- Experience in supporting SONIC, Broadcom® FastPath, Cap Gemini ISS (previously Aricent ISS) software stacks.
- Automated test framework for regression testing and use of industry standard test equipment, a.o. from Xena Networks.

AimValley Proven Track Record

- Avionics Ethernet Switch
- Avionics Robust Ethernet Switch
- Network Software Stack – AimOS
- AimOS – Development Kit R2



AimValley's product development can include system verification and robustness testing and solutions are delivered as prototype or for mass production.

Why AimValley?

AimValley is a reliable provider of packet switching technology since 2003, delivering solutions for:

- High speed data processing applications
- Complex FPGA-based accelerated systems
- High speed, low power hardware equipment
- Robust embedded software
- Early adopter of Acceleration Technology

AimValley understands the full complexities as well as the subtle nuances of designing great edge solutions. We excel in building complex systems that are part of your product in the fields of Industry 4.0, Big Data, Healthcare and Transportation markets. Our combined skills represent all the important aspects required for the development of end-to-end systems.

Our customers enjoy the benefits of working with a strong team with over 2000 years engineering experience. AimValley is a trusted partner of Tier 1 customers in Telecom and Industrial markets and has shipped more than 100 000 products.

Quality Focus

- Outstanding track record of on-time delivery
- Best in Class Designs – Time, Budget & Quality
- ISO9001, ISO140001, Ecovadis Platinum CSR

AimValley
Utrechtseweg 38
1213 TV Hilversum
The Netherlands
phone +31 35 689 1900
sales@aimvalley.com
www.aimvalley.com