Building Forward Together | ADLINK

Creating a flexible Entertainment System Platform

Technical Forum
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Qseven based flexible Entertainment System Platform

Challenge

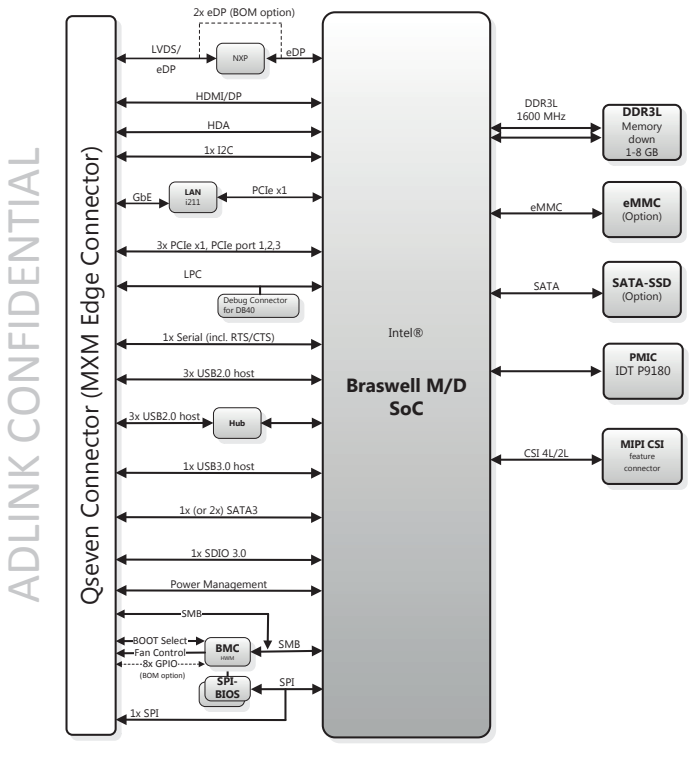
A customer had to deliver a flexible entertainment platform on a standard, x86 based platform. The main purpose was to act as an information terminal and entertainment system supporting streaming of full HD content from a central server. Vital features were a very small physical size and low power consumption to enable seat and tray mount in various configurations.
Other key criteria included advanced ruggedness (especially versus vibration), EMC safety and long-term availability of at least 10 years with the option of technology updates without changing the concepts. Highest operational availability and least maintenance effort were a must due to relatively difficult access to the finally mounted system.
The system should support scalability and different build options (mainly different screens with different resolutions to adapt to different environments, e.g. coaches, rail cars and airplane cabins.

Functional Requirements

The system was to be x86 based to support existing customer software and APIs as good as possible. Also the system should boot with customer's logo. To keep availability high and maintenance cost low remote diagnosis and maintenance features should be implemented. For low cost configurations
multi-screen displays with only one control unit should be supported. Hard- and Software upgrades should be available over the vehicle's lifetime of up to 20 years without a need to replace the respective seat as the overall housing.

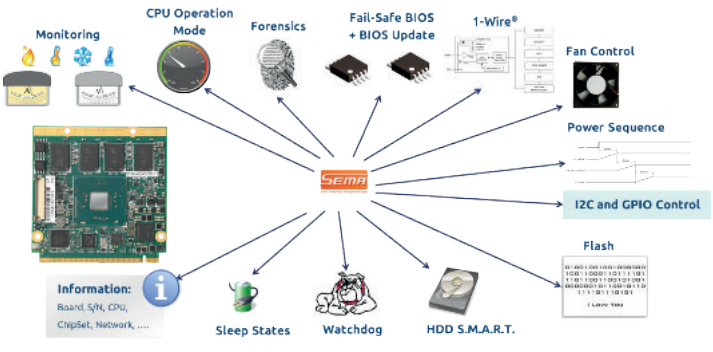
ADLINK Solution

ADLINK Qseven modules provide x86 standards, multimedia functionality and API compatibility at minimal sizes and competitive prices and a footprint of only 70x70mm². The modular concept and the exact defined thermal interface of the Qseven standard enable longest-term availability and easy system evolutions and upgrades by simply changing the module. Hardware and software backward compatible modules can ensure rebuy availabilities of twenty years and more with the same carrier board and housing. ADLINK offers full product lifetime management (PLM) services as an option so the customer can outsource his hardware supply chain completely.
In the actual case ADLINK developed a size-optimized, low profile custom baseboard on base of the existing reference carrier board. Equipped with the latest, Braswell based Q7-BW module ADLINK delivered a ready-to-use platform with long-term support. The overall system has been thermally simulated to ensure top, throttling-free performance with different processor configurations. EMC tests verified the suitability for plane cabin applications for the overall system. Service and maintenance access was realized using ADLINK's proven SEMA solution.
Latest Braswell processors feature 2 or 4 cores with up to 2.6 GHz CPU frequency and introduce up to 16 execution units of Intel's 8th Generation HD400/405 Graphics. The system can support up to 3 independent graphic displays with resolutions of up to 4k. Integrated displays can be linked with cost efficient LVDS cables while external displays can be connected via DisplayPort or HDMI cables which allow longer cable lengths. All configurations enable hardware support for high efficient H.265 streaming and decoding.



ADLINK Solution Benefits

Besides ADLINK's long term experience in the embedded market ADLINK was the only company that could deliver all required services and products for this entertainment system from one vendor with all resources inhouse:

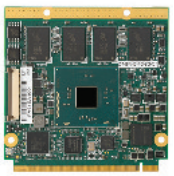


- Qseven CPU module
- Smart Embedded Management Agent (SEMA) middleware
- Development of an optimized custom carrier board
- EMC Test and verification
- Thermal simulation and verification
- Bios customization
- Cloud services
- Full product lifecycle management (PLM).

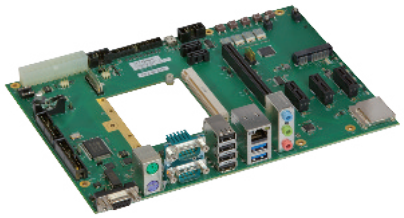
Getting everything from one partner is an outstanding benefit when quick and reliable delivery is required.
The chosen modular Qseven solution with its clearly defined mechanical and thermal interfaces ensures hassle-free long term delivery capabilities and upgrade options. Having already a 5 years plus availability for the actual Qseven computer module and the availability of ADLINK's PLM services make things even easier.

Selection Guide

Module | Baseboard







Model Name	Q7-BW	Q7-BT
Form Factor & Compatibillity	Qseven v2.0 Standard size: 70 x 70 mm	Qseven v2.0 Standard size: 70 x 70 mm
CPU	Intel® Celeron /Pentium N3000 Series SoC	Intel® Atom Processor E3800 Series SoC
DRAM	Up to 8GB DDR3L at 1600 MT/s	Up to 4GB DDR3L at 1333/1066MHz
Cache	L2: 2 MB	L2: 512kB to 2MB
Integrated Graphics Support	DirectX 12/11.2, OpenGL 4.2/3.3, OpenCL 1.2 Decode: H.265, H.264, MPEG2, MVC, VC-1, WMV9, JPEG, VP8 Encode: H.264, MVC, JPEG	DirectX 11.1, OGLES 2.0, OGL 3.2 Decode: H.264, MPEG2, VC-1, VP8 Encode: H.264 and MPEG2
LAN	Intel® MAC/PHY i211 supporting 10/100/1000 GbE	Intel® MAC/PHY i210IT supporting 10/100/1000 GbE
USB	1x USB 3.0 6x USB 2.0 host	1x USB 3.0 5x USB 2.0 host 1x USB 2.0 client
Serial ATA	2x SATA or 1x SATA and 1x SATA SSD	2x SATA or 1x SATA and 1x SATA SSD
Audio	HDA	HDA
PCI Express	3x PCIe x1	3x PCIe x1
eMMC	4GB to 64GB (optional)	4GB to 64GB (optional)
SEMA Support	Yes	Yes
Camera	2x MIPI CSI 4L/2L camera interfaces	1x MIPI CSI 4L/1L camera interface
Power Supply	3.0 V ~ 5.25 V DC ±5%	3.0 V ~ 5.25 V DC ±5%
Operating Temperature	0°C to +60°C	0°C to +60°C -40°C to +85°C
Standard OS (BSP Support)	Windows 7, 8.1, 10, Yocto Linux, Android	Windows 7, 8, WEC7, Yocto Linux

Model Name	Q7-BASE
Displays	HDMI, Dual channel LVDS 18/24-bit with backlight connector
SDIO	4/8-bit SDIO for SD/MMC
HDA	1x HDA codec ALC886
Audio	1x line in, 1x line out, 1x mic, 1x S/PDIF in/out
System Connector	1x SPI, 1x SMBus, watchdog, BIOS disable, battery low, thermal
Serial	1x UART
CAN	1x CAN
USB	5x USB2.0 host, 1x USB2.0 client, 1x USB3.0
PCI Express	3x PCIe x1, 1x miniPCIe/USB3
SATA	2x SATA
Ethernet	1x GbE
Boot source	Select SPI, eMMC, SD card, SATA
Misc	2x COM, 1x LPT, 2x PS/2 for keyboard & mouse, 7-segment display for BIOS post code, status LEDs and control buttons, battery
Power Modes	ATX/AT mode
Standard Voltage input	5V, 12V, 3.3V from ATX power connector
Board Connector	MXM2 230-pin edge connector

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