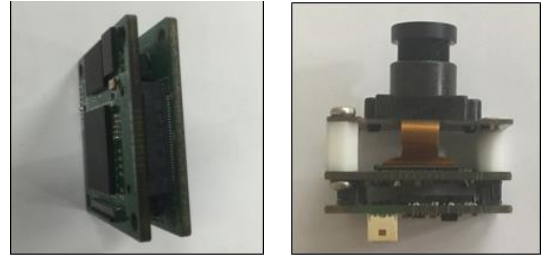


ATUS FHD Ethernet AVB Camera Features



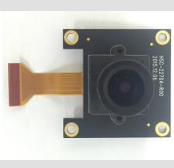


100BASE-T1 Ethernet AVB Camera for Automotive

ATUS Ethernet AVB Video Camera Platform that allows rapid IP evaluation for the video codec from various incoming data sources and vision algorithms. And it has various connections available to populate with different types of camera sensors and display panels with a 100BASE-T1 BroadR-Reach connection.

Using this development kit, BroadR-Reach PHY and Aptina AR0230AT FHD or AR0140AT HD camera sensor provided the platform to prove hardware Logic IPs and software stack co-designing for the low latency automotive camera system.

- Xilinx ZYNQ 7020 Device
- DDR3 Memory : 16bit 512MB
- QSPI Flash : 16MB
- 30P ZIF Connector for Camera Sensor (Hi-SPI Video Interface)
- De-bayer(CFA) with optional ISP
- Baseline H.264 Encoder (up to 1080P@30fps)
- RGMII/MII MAC with IEEE1588 v2 PTP
- BroadR-Reach Transceiver (100BASE-T1)
- Programmable multi-power rail with single chip PMIC
- 38mm x 38mm Board Size
- Application : Automotive / Drone / Surveillance etc

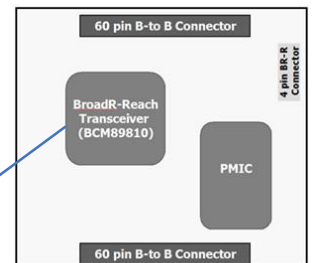
ATUS Ethernet AVB Camera (38mm x 38mm)

| | | |
|--|---|---|
|  |  |  |
| HSC-2270A-R00_SENSOR (Aptina AR0230AT) | ASVZ20I (Xilinx ZYNQ XC7Z020-2CLG400I) | ASB100BT1 (Broadcom BCM89810) |

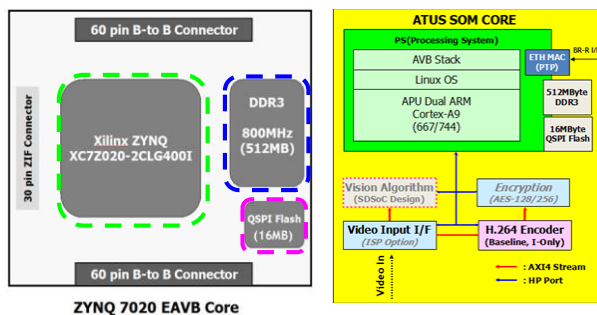
ATUS SoM Module Base Board

BroadR-Reach 2-Wire Interface (100BASE-T1)

Broadcom BCM89810 supports Full-Duplex Communication in 100Mbps by BroadR-Reach 2-Wire Automotive Ethernet.



ZYNQ 7020 EAVB Base



- BR-R I/F : BroadR-Reach (100BASE-T1)
- PTP : Precision Time Protocol

1. ZYNQ
 - VCCINT, VCCPINT, VCCBRAM: 1.0V
 - VCCAUX, VCCPAUX, VCCPLL: 1.8V
 - Configuration, BANK0: 3.3V
2. MEMORY
 - DDR3 MEMORY, BANK502: 1.35V
 - FLASH MEMORY, BANK500: 3.3V
3. PHY
 - BroadR-Reach 100BASE-T1(I/O), BANK34: 1.8V
 - BroadR-Reach 100BASE-T1(DVDD): 1.2V
 - BroadR-Reach 100BASE-T1(AVDD): 3.3V

ATUS Ethernet AVB Stack Overview

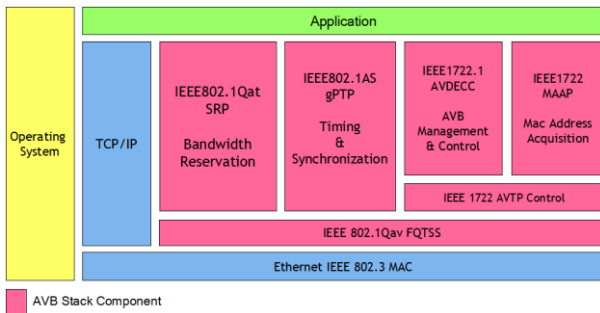
Audio Video Bridging (AVB) is the exciting new IEEE 802.1 extension to Ethernet specifically engineered for real-time, low-latency, fully synchronized streaming of audio and video over Ethernet.

The ATUS audio video bridging (AVB) software provides a complete set of AVB protocols for use on several different ZYNQ development boards, reducing the need for hardware changes and eliminating redevelopment costs. The ATUS AVB software can run on platforms with and without AVB hardware assist.

Supported Platforms

| Development Board | ATUS SoM (Zynq-7000 XC7Z020) | NXP I.MX 6 |
|-------------------|------------------------------|-----------------|
| CPU Processor | ARM® Cortex®-A9 | ARM® Cortex®-A9 |
| Linux OS | Yes | Yes |
| RTOS | 2017 Q2 | 2017 Q@ |

AVB Stack Block Diagram



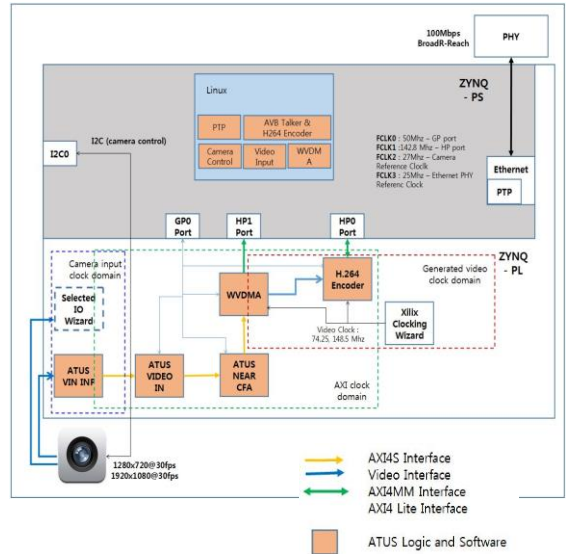
Features

- Endpoint implementation for IEEE 1722 AVTP, 802.1AS gPTP, 802.1Qav FQTSS, 802.1Qat SRP, 1722.1 AVDECC.
- Compliance to the Ethernet AVB IEEE specification.
- Audio/Video talker and listener with Media Clock Recovery.

Specification

- IEEE802.1Qat SRP: MRP with VLAN registration, stream reservation and MAC registration applications.
- IEEE802.1AS gPTP: network time and synchronization, link delay measurement and compensation, clock rate adjustment, clock master selection.
- IEEE1722.1 AVDECC : AVB station discovery, enumeration connection management and control
- IEEE1722 MAAP : MAC Address Acquisition Protocol.
- IEEE 1722 AVTP: packetizer for IEC 61883-6 uncompressed audio, IEC 61883-4 MPEG-TS compressed video.
- IEEE802.1Qav FQTSS: Forwarding and Queuing for Time Sensitive Streams.

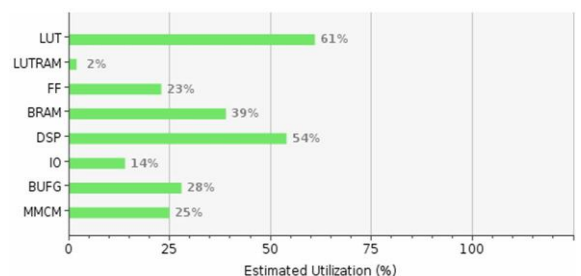
ATUS ZYNQ Design (VIVADO 2015.4)



IP Core

| IP CORE | Version | Memory Address | Instance | Bus | Utilization | NOTE |
|---------------------------|--------------|---------------------------|------------------------|-------------------|--|------|
| ZYNQ7 Processing System | 5.5(REV.3) | - | Processing_sys_tem_7_0 | AXI4,AXI4S,PS I/O | Reg. 10 Lut. 83 | |
| Clocking Wizard | 5.2(REV. 1) | - | Clk_wiz_0 | AXI4 | MMCM. 1 | |
| AVB_CODEC_ZYNQ_v1_0 | 1.0(REV. 15) | 0x5000_0000 ~ 0x50FF_FFFF | AVB_CODEC_ZYNQ_0 | AXI4 , Video | Reg. 19269 Lut. 27599 Ram. 29.5 dsp. 108 | |
| Atus_vwdma | 1.0(REV. 85) | 0x43C1_0000 ~ 0x43C1_FFFF | Atus_vwdma_0 | AXI4S,AXI4,Video | Reg. 1033 Lut. 1302 Ram. 10 dsp. 10 | |
| Atus_video_inpt | 1.0(REV. 95) | 0x43C3_0000 ~ 0x43C3_FFFF | Atus_video_inpt_0 | AXI4,AXI4S, Video | Reg. 685 Lut. 485 Ram. 3 | |
| atus_near_cfa | 1.0(REV. 36) | - | Atus_near_cfa_0 | AXI4S | Reg. 313 Lut. 520 Ram. 8 | |
| Atus_vin_inf | 1.0(REV. 80) | - | Atus_vin_inf_0 | Video | Reg. 343 Lut. 208 Ram. 4 | |
| SelectIO interface Wizard | 5.1(REV. 6) | - | Selectio_wiz_0 | - | | |

ZYNQ PL resource utilization



| Resource | Estimation | Available | Utilization % |
|----------|------------|-----------|---------------|
| LUT | 53200 | 87000 | 61.21 |
| LUTRAM | 17400 | 17400 | 1.55 |
| FF | 106400 | 458000 | 23.48 |
| BRAM | 140 | 358 | 38.93 |
| DSP | 220 | 400 | 53.64 |
| IO | 125 | 875 | 13.60 |
| BUFGR | 32 | 112 | 28.12 |
| MMCM | 4 | 16 | 25.00 |