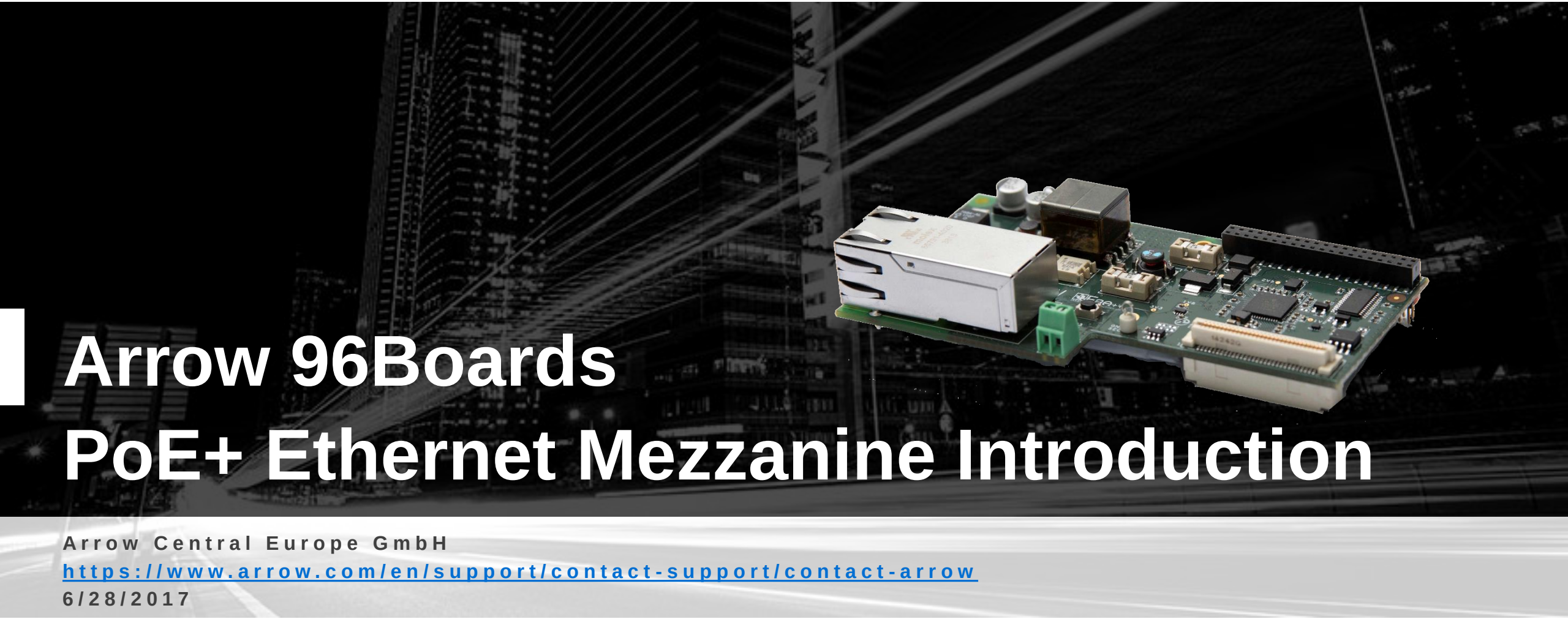


Arrow 96Boards
PoE+ Ethernet Mezzanine Introduction

Arrow Central Europe GmbH
https://www.arrow.com/en/support/contact-support/contact-arrow
6/28/2017

Five Years Out

Ethernet Mezzanine

Agenda for todays session

- Introduction of special guest
- Overview about the board
- PoE Introduction
- Hands-On
  - Set and Read MAC Address
  - Network setup
  - Test using iperf2
- Short outlook about future projects

Special Guests

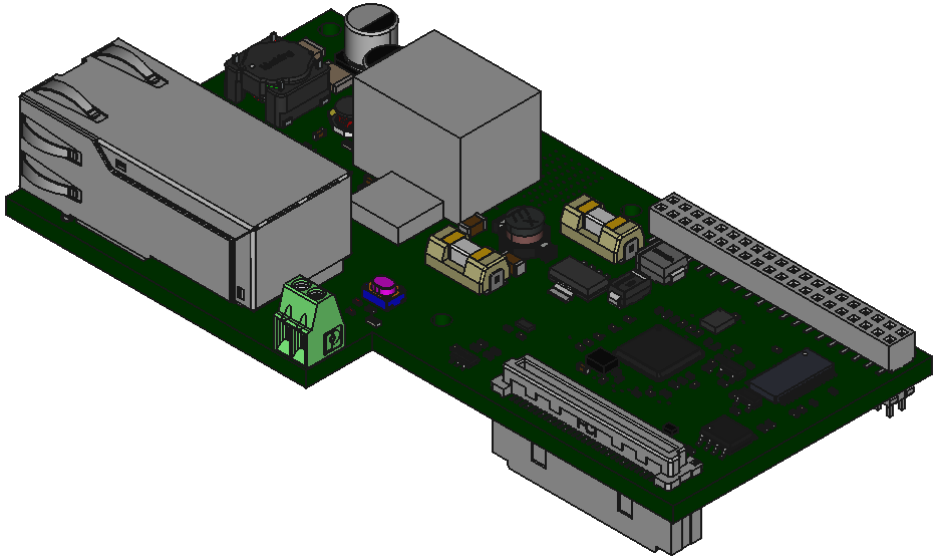
Welcome…

PoE+ Ethernet Mezzanine

Overview

WITH THIS SHIELD THE DRAGONBOARD410C EXPANDS ITS FUNCTIONALITIES WITH:

- Gigabit Ethernet through Microchip LAN7850
- Hardware Asymmetric Crypto Engine through TPM Atmel AT97SC3205T
- POE+ PD IEEE 802.3at 25.5W Compliant through Linear Technology LT4276



PoE+ Ethernet Mezzanine

Mezzanine Card Closer Look

PoE+ Mezzanine Boards key components:

Linear Technology LT4276
Allows to power the DragonBoard and an additional 12V device over an external Ethernet PoE+ line

Microchip LAN7850
Provides Gigabit Ethernet through high Speed USB 2.0

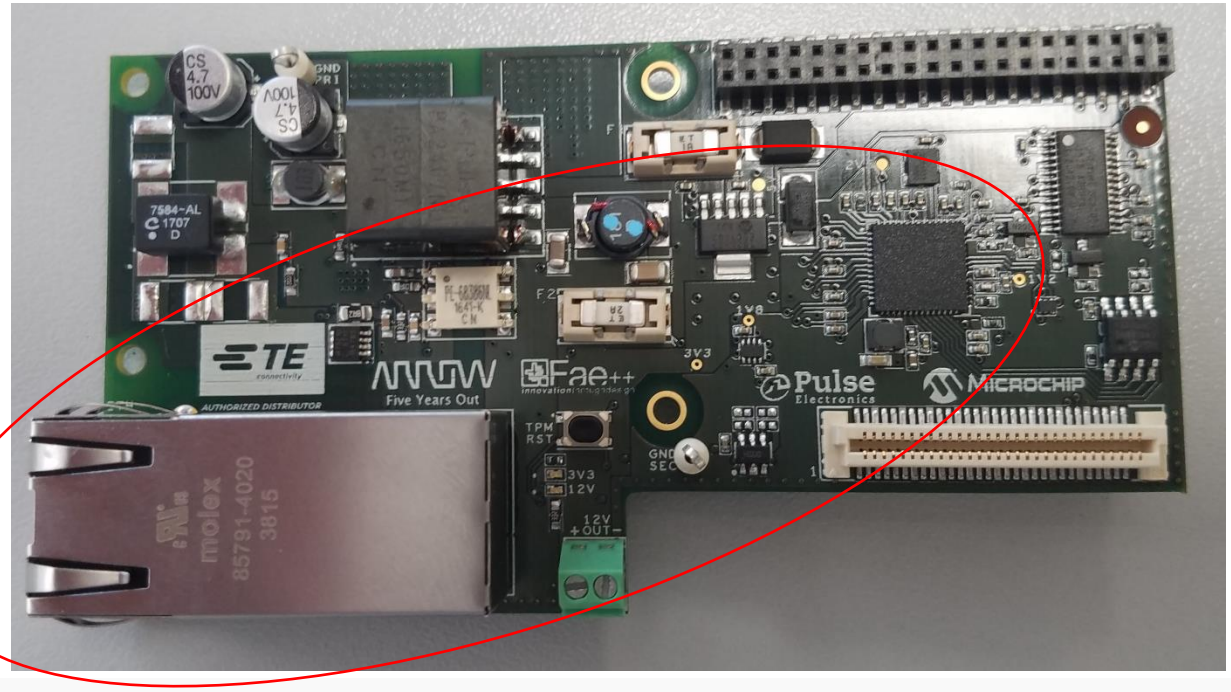
Microchip Trusted Plattform Module AT97SC3205T
Secures the system by Hardware Asymmetric Crypto Engine

PoE Injectors

PoE+ Ethernet Mezzanine

Ethernet Part

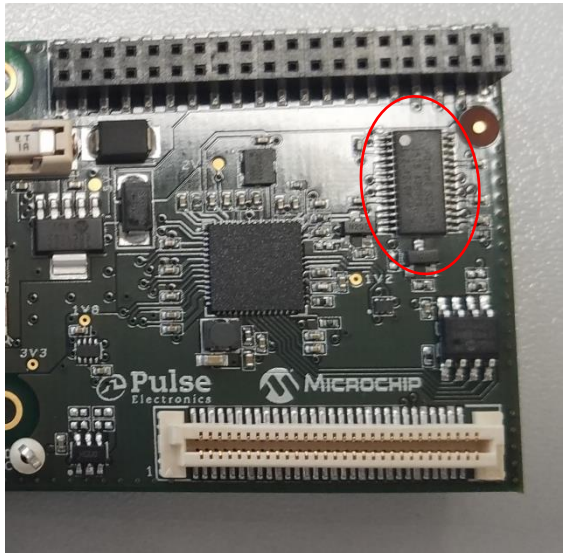
LAN7850
Hi-Speed USB 2.0 to 10/100/1000 Ethernet Controller with HSIC
The USB of the DragonBoard410C is used for the Ethernet communication in 10/100/1000Mbps link rate.



PoE+ Ethernet Mezzanine

Trusted Platform Module

AT97SC3205T
Trusted Platform Module I2C Interface
Compliant to the Trusted Computing Group (TCG) Version 1.2 Specification
Hardware Asymmetric Crypto Engine
FIPS-140-2 Module Certified
Including:
High-quality Random Number Generator (RNG), HMAC, AES, SHA, RSA
NV Storage Space for 2066 bytes of User Defined Data



PoE+ Ethernet Mezzanine

Power over Ethernet

POE+ is mainly done by:

- Linear Technology LT4276 (POE+ PD)
- Pulse Electronics flyback transformer and gate driver
- Gigabit POE+ RJ45 ethernet connector with integrated bridge and PD circuitry

PoE+ Ethernet Mezzanine

Use Cases / Markets

Running some tests

PoE+ Ethernet Mezzanine

Checking network connection

```
linaro@linaro-alip:~$ sudo ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.2.114  netmask 255.255.255.0  broadcast 192.168.2.255
        inet6 fe80::4534:1e8:c613:fbc4  prefixlen 64  scopeid 0x20<link>
        inet6 2003:c7:83d0:b977:698b:9cac:bc39:426f  prefixlen 64  scopeid 0x0<global>
        ether 9a:3b:88:94:30:c5  txqueuelen 1000  (Ethernet)
        RX packets 25769  bytes 34893118 (33.2 MiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 15145  bytes 1419876 (1.3 MiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1  (Local Loopback)
        RX packets 184  bytes 13024 (12.7 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 184  bytes 13024 (12.7 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlan0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether 02:00:ad:ec:2e:48  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

linaro@linaro-alip:~$
```

```
linaro@linaro-alip:~$ usb-devices

T:  Bus=01 Lev=00 Prnt=00 Port=00 Cnt=00 Dev#=  1 Spd=480 MxCh= 1
D:  Ver= 2.00 Cls=09(hub  ) Sub=00 Prot=01 MxPS=64 #Cfgs=  1
P:  Vendor=1d6b ProdID=0002 Rev=04.09
S:  Manufacturer=Linux 4.9.30-linaro-lt-qcom ehci_hcd
S:  Product=EHCI Host Controller
S:  SerialNumber=78d9000.ehci
C:  #Ifs= 1 Cfg#= 1 Atr=e0 MxPwr=0mA
I:  If#= 0 Alt= 0 #EPs= 1 Cls=09(hub  ) Sub=00 Prot=00 Driver=hub

T:  Bus=01 Lev=01 Prnt=01 Port=00 Cnt=01 Dev#=  2 Spd=480 MxCh= 3
D:  Ver= 2.00 Cls=09(hub  ) Sub=00 Prot=02 MxPS=64 #Cfgs=  1
P:  Vendor=0424 ProdID=2513 Rev=0b.b3
C:  #Ifs= 1 Cfg#= 1 Atr=e0 MxPwr=2mA
I:  If#= 0 Alt= 1 #EPs= 1 Cls=09(hub  ) Sub=00 Prot=02 Driver=hub

T:  Bus=01 Lev=02 Prnt=02 Port=01 Cnt=01 Dev#=  3 Spd=12  MxCh= 0
D:  Ver= 1.10 Cls=00(>ifc ) Sub=00 Prot=00 MxPS=64 #Cfgs=  1
P:  Vendor=1d57 ProdID=fa20 Rev=10.01
S:  Manufacturer=Compx
S:  Product=2.4G Receiver
C:  #Ifs= 3 Cfg#= 1 Atr=a0 MxPwr=100mA
I:  If#= 0 Alt= 0 #EPs= 1 Cls=03(HID  ) Sub=01 Prot=01 Driver=usbhid
I:  If#= 1 Alt= 0 #EPs= 1 Cls=03(HID  ) Sub=01 Prot=02 Driver=usbhid
I:  If#= 2 Alt= 0 #EPs= 1 Cls=03(HID  ) Sub=00 Prot=00 Driver=usbhid

T:  Bus=01 Lev=02 Prnt=02 Port=02 Cnt=02 Dev#=  4 Spd=480 MxCh= 0
D:  Ver= 2.10 Cls=ff(vend.) Sub=00 Prot=ff MxPS=64 #Cfgs=  1
P:  Vendor=0424 ProdID=7850 Rev=03.00
C:  #Ifs= 1 Cfg#= 1 Atr=e0 MxPwr=2mA
I:  If#= 0 Alt= 0 #EPs= 3 Cls=ff(vend.) Sub=00 Prot=ff Driver=lan78xx
linaro@linaro-alip:~$
```

PoE+ Ethernet Mezzanine

Running first tests

Server

```
root@linaro-alip:~# iperf3 -s
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
Accepted connection from 192.168.2.109, port 56310
[  5] local 192.168.2.114 port 5201 connected to 192.168.2.109 port 56314
[ ID] Interval           Transfer     Bandwidth       Retr  Cwnd
[  5]   0.00-1.00   sec  13.4 MBytes   112 Mbits/sec   18   55.6 KBytes
[  5]   1.00-2.00   sec  14.6 MBytes   123 Mbits/sec   29   29.9 KBytes
[  5]   2.00-3.00   sec  14.7 MBytes   123 Mbits/sec   17   77.0 KBytes
[  5]   3.00-4.00   sec  14.8 MBytes   124 Mbits/sec   20   18.5 KBytes
[  5]   4.00-5.00   sec  14.9 MBytes   125 Mbits/sec   18   59.9 KBytes
[  5]   5.00-6.00   sec  14.8 MBytes   124 Mbits/sec   19   11.4 KBytes
[  5]   6.00-7.00   sec  14.7 MBytes   123 Mbits/sec   22   55.6 KBytes
[  5]   7.00-8.00   sec  15.0 MBytes   126 Mbits/sec   14   41.3 KBytes
[  5]   8.00-9.00   sec  14.5 MBytes   121 Mbits/sec   23   72.7 KBytes
[  5]   9.00-10.00  sec  14.9 MBytes   125 Mbits/sec    9   62.7 KBytes
[  5]  10.00-10.15  sec  2.21 MBytes   122 Mbits/sec    2   52.8 KBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Retr
[  5]   0.00-10.15  sec   148 MBytes   123 Mbits/sec  191             sender
[  5]   0.00-10.15  sec  0.00 Bytes  0.00 bits/sec                  receiver
-----------------------------------------------------------
Server listening on 5201
-----------------------------------------------------------
```

Client

```
c:\dev\tools\iperf-3.1.3-win64\iperf-3.1.3-win64>iperf3.exe -c 192.168.2.114
Connecting to host 192.168.2.114, port 5201
[  4] local 192.168.2.109 port 56342 connected to 192.168.2.114 port 5201
[ ID] Interval           Transfer     Bandwidth
[  4]   0.00-1.00   sec  14.5 MBytes   122 Mbits/sec
[  4]   1.00-2.00   sec  13.5 MBytes   113 Mbits/sec
[  4]   2.00-3.00   sec  14.8 MBytes   124 Mbits/sec
[  4]   3.00-4.00   sec  7.50 MBytes  62.9 Mbits/sec
[  4]   4.00-5.01   sec  4.50 MBytes  37.4 Mbits/sec
[  4]   5.01-6.00   sec  14.2 MBytes   121 Mbits/sec
[  4]   6.00-7.00   sec  13.6 MBytes   115 Mbits/sec
[  4]   7.00-8.00   sec  14.8 MBytes   124 Mbits/sec
[  4]   8.00-9.00   sec  20.9 MBytes   175 Mbits/sec
[  4]   9.00-10.00  sec  16.8 MBytes   140 Mbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth
[  4]   0.00-10.00  sec   135 MBytes   113 Mbits/sec                  sender
[  4]   0.00-10.00  sec   135 MBytes   113 Mbits/sec                  receiver

iperf Done.
```

```
c:\dev\tools\iperf-3.1.3-win64\iperf-3.1.3-win64>iperf3.exe -c 192.168.2.114 -R
Connecting to host 192.168.2.114, port 5201
Reverse mode, remote host 192.168.2.114 is sending
[  4] local 192.168.2.109 port 56314 connected to 192.168.2.114 port 5201
[ ID] Interval           Transfer     Bandwidth
[  4]   0.00-1.00   sec  15.2 MBytes   127 Mbits/sec
[  4]   1.00-2.00   sec  14.6 MBytes   123 Mbits/sec
[  4]   2.00-3.00   sec  14.8 MBytes   124 Mbits/sec
[  4]   3.00-4.00   sec  14.8 MBytes   124 Mbits/sec
[  4]   4.00-5.00   sec  14.8 MBytes   124 Mbits/sec
[  4]   5.00-6.00   sec  14.7 MBytes   123 Mbits/sec
[  4]   6.00-7.00   sec  14.8 MBytes   124 Mbits/sec
[  4]   7.00-8.00   sec  14.8 MBytes   124 Mbits/sec
[  4]   8.00-9.00   sec  14.8 MBytes   124 Mbits/sec
[  4]   9.00-10.00  sec  14.8 MBytes   124 Mbits/sec
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Retr
[  4]   0.00-10.00  sec   148 MBytes   125 Mbits/sec  191             sender
[  4]   0.00-10.00  sec   148 MBytes   124 Mbits/sec                  receiver

iperf Done.
```

Thank you for your time!