



Network Services Report – Verilan Event Services
Hyatt O’Hare, Chicago, IL, USA
Mar 4-9, 2018

Verilan provided network infrastructure and audio-visual equipment, personnel and services to the IEEE’s March, 2018 802 plenary at the Hyatt O’Hare, Chicago, IL, USA

External Connectivity, Routers, Core Switching

The hotel provided up to 1 Gigabit of available upload and download capacity (500MBit burstable to 1Gigabit) during the conference.

We had 8 external IP’s readied for an 8-way failover across 8 ports on two different routers.

We didn’t need the backup 7. We will probably order four for the next conference.

This is the first event in a while that has run interconnectivity between Verilan switches across a “Dry VLAN” (a VLAN where no hotel equipment is present) provided by the hotel.

Aside from about 30 minutes where one of the ports that IEEE was using was reassigned into a hotel VLAN, it worked very well.

There was no option to do direct physical connections instead, as there simply aren’t enough physical lines available to be able to support the IEEE guest network.

It worked very well. This is likely to happen in the future, as hotel IT is further centralized and hotel wiring infrastructure upgrades are deferred.

Infrastructure, Internal Connectivity, Servers

Physical layer connectivity was a mix of multimode fiber and Cat5. There were seven separate wiring closets to coordinate, as well as a link-aggregated connection to the wired cafe and two secondary switches in the Grand Ballroom area.

Normally we would link-aggregate available ports between wiring closets in Port Channels (bonding) to increase throughput and reduce latency between areas of the hotel. We were able to do a very little bit in this instance, as our hosts weren’t comfortable setting up port channels on our guest VLAN links. Every bit does help, though, and throughput was really good.

All virtual servers were updated prior to this plenary session. They had about 8 years of deferred maintenance to be done on them. Griffin was brought 8 years more current thanks to a complete rebuild on an Ubuntu 16.10 base. It seemed to work really well.

The available wall ports stemming from each Intermediate Distribution Frame (IDF) / Wiring Closet were usually plentiful and in excellent repair.

The wiring closets themselves served as excellent locations in which to house wireless APs.

The “Red Bar” at the lobby level, the IDF behind the registration desk, the IDF near the Rosemont Ballroom on the entry level and the IDF above Grand Ballroom C all housed Access Points that served many happy folks without being obtrusively out in the main hotel spaces.

It was a subtle and effective way to get network connectivity into public spaces without clashing with the hotel’s aesthetic.

Access Points

Wireless Access Points with A/B/G/N capability, Cisco 1142's, were used this round. They were all upgraded to the most-current version of firmware, containing certain Q3 and Q4, 2017 WPA2 fixes, prior to the March, 2018 Plenary.

This upgrade uncovered some interop issues between the 2017 firmware and certain 2011 and 2012 versions of the Intel 6200/6300 AGN wireless adapter driver in Windows 7 32-bit and 64-bit.

Luckily the IT staff consists of, among other things, Intel Ethernet device driver validation specialists with a combined 22 years of experience supporting and debugging exactly this type of interop scenario.

So... piece of cake.

Nine attendees were sent off happy with 6-years-newer updated drivers installed by the Verilan staff after having connectivity problems. One attendee issue was resolved by setting the older driver back into B/G only mode.

The Cisco 1142 APs do not support 802.11n "HT" High-Throughput mode. This caused an incompatibility with certain newer Intel 8250 and 8260 series devices.

Six attendees were given installs of new Intel wireless drivers for Windows 10 and their Intel 8250/826x series wireless devices set to "HT – Disabled" for compatibility reasons.

They were still in 802.11n mode, but with a narrower, more standard spectrum spread.

As the Intel 8250 and 8260 wireless chipsets continue to proliferate on new laptops with Windows 10 installed, especially after the next corporate refresh cycle in Fall ("Back to School") of 2018, this will become an issue that may require the IEEE 802 network providers to offer HT-compatible 802.11n equipment for convenience and ease-of-compatibility.

Wired Cafe

The wired cafe was near the meeting ballrooms. It got some use by attendees, but mostly as a place to sit, with 1 or 2 actually connecting to the wired ports of the switch provided.

It provided about 160Mbit bi-directional connectivity.

Help Desk

We ran the "Network Operations Center" from the network help desk from at least 8am to 5pm daily.

16 people out of 700 had connectivity issues with the Cisco 1142 A/B/G/N access points. These access points had been upgraded to the most-recent firmware image containing WPA2 fixes prior to the show, a security requirement that would be unwise to downgrade.

9 were resolved by device driver updates of their 2011 and 2012 Windows 7 Intel Wireless drivers, managed by the Verilan Staff.

5 were resolved by upgrading their Windows 10 Intel wireless device driver to the most-current version and disabling 802.11n "HT" mode.

1 resolution was by disabling 802.11n mode altogether and using 802.11b and 802.11g mode only.

Two attendees did not have administrator rights to their systems, but managed to contact their admins remotely and had them install the drivers provided by the help desk staff.

All items were successfully resolved.

Our efforts to help migrate presenters to HDMI (and away from VGA) bore fruit as we passed out about 20 digital format-to-HDMI converter dongles, helping attendees take advantage of their laptops' digital video output formats such as Display port, mini display port, micro display port, mini-HDMI, Micro-HDMI, USB-C and, finally, USB 3.0 when necessary. The sooner presenters are all able to

connect via HDMI, the sooner the IEEE can save on the costs of shipping VGA cabling for each session. We managed to surprise many attendees and presenters who **thought** they only had VGA output from their laptops by finding their mystery non-VGA, entirely digital video output port of varying form factor, identifying it, and fitting it with an HDMI interface pin-adaptor. It was satisfying work.

On top of 16 highly successful device driver update clinics, we fielded requests for replacement mice, replacement power supplies and a couple of PowerPoint consultations (thanks, Bret Plumb) as well. In all, it felt like having the Network Help desk visible and near the registration desk was really fruitful.

Network Monitoring

The network for this Plenary marks a move from various commercial monitoring solutions such as Intermapper to a fully open-source monitoring package for network elements (AP's, switches, virtual servers) called Zabbix. It works excellently and has really clear monitoring and alerting. It was still learning IPs and scanning during Sunday evening's incident (below), but immediately reported two instances of unplugged APs during the week. It is an entirely free open-source solution that the network team has really enjoyed working with for this Plenary. Kudos go to Geofry Glenn for managing it and implementing it really effectively.

Network Outages/Issues

On Sunday evening, there was a brief outage of wireless service in the Director AB room.

1. The hotel had inadvertently assigned a switch "Dry VLAN" port for visiting IT into their Hyatt Guest VLAN for about 20 minutes. It was unintentional on their part.
2. This caused the Verilan switch to eventually receive enough Bridge Protocol Data Units for spanning tree, which did not match its assigned VLAN, to place its uplink port into error/disabled state.
3. This dropped outbound Internet connectivity into the Director rooms while Verilan staff was setting up ballrooms and out of cell connectivity zones for network alerts.
4. When connectivity was restored, the APs were still on the Hyatt Guest for about 5 minutes as Hyatt IT very politely resolved the issue.
5. While debugging, it was uncovered that one of the Verilan APs was off, as the port it was using had been re-assigned to a phone port. This was immediately rectified.
6. Added to this was a high output from the Hyatt Ruckus AP above the Director rooms. PSAV staff disconnected the AP after the meeting and it remained off for the week.

In addition to entirely disconnecting the Ruckus AP above Directors A/B rooms, PSAV staff were extremely helpful in making sure to take their Grand Ballroom APS down two significant levels, allowing the Verilan-secure SSID coming from the Cisco 1142 access points to take power level precedence.

In a move that will be common for future hotel environments, the PSAV network staff needed to retain some level of functional wireless signal for the hotel's back-of-house operations. They managed to do this at a lower power level without inconveniencing the IEEE plenary network.

Offering neighborly counterpoint to the PSAV team's inadvertent and brief VLAN-swizzling at the beginning of the week, network staff managed to cause a 90-second outage of the fiber link serving the Grand Ballroom area very late Thursday night, after all IEEE 802 activity in that section of the hotel was well-past completed and no Plenary attendees were on that portion of the network.

Connectivity was immediately and sheepishly restored once the error was detected and PSAV contacted, with the assurance from PSAV that no harm had been done.

AV Outages/Issues

- One of the older InFocus LP640 projectors had a brand-new bulb fade and fail on Tuesday. It was replaced at the end of day.
- 1024x768 native projector modes force some laptops or some virtual server installations into the native mode of the secondary output display on the primary display. This is a real interruption to productivity when it occurs.
 - It is important that a “resolution resolution” be made during the next engineering committee meeting.
 - Negotiating a **base, native resolution** of 1080p (HD) on all projectors in future contracts for projectors used at plenary and interim sessions will prevent issues of primary displays becoming unmanageable when a system attempts to replicate the secondary display’s resolution.
- Long-throw and medium-throw distance projectors were not as useful in some of the smaller rooms of the Hyatt O’Hare, whereas the short-throw (not ultra-short throw) projector style proved eminently versatile as workhorses of functionality where only 3-4 feet from a screen was available.
 - There should likely be some discussion in the steering committee on stating a preference for short-throw projectors for smaller meeting rooms. It helps to give more seating and table options.
- InFocus projectors have very slow hunt-for-source times. There seems to be no quick solution to prevent them from hunting for VGA, HDMI 1, HDMI 2 sources. The AV team is investigating firmware and hardware tweaks to make this process either quicker or lock to the HDMI port.
 - Dell Projectors seem not to have this issue, perhaps due to a better signal detection mechanism?
- The Gefen VGA-to-HDMI converters provided for presenters with VGA-only laptops work excellently with all of the systems that have VGA only when directly-connected to HDMI inputs, but not always well with the Gefen HDMI splitters in the middle of the chain, used in large rooms with dual displays. Attendees with VGA only in those rooms sometimes needed to ask colleagues to present slides.
 - The best solution to this may be to provide USB-to-HDMI adapters for those with VGA-only laptops, and only offer HDMI connectivity straight through.
 - These were available at the help desk, but usually the issues were discovered in-session.
 - Having a couple of spare “presenter” laptops for checkout might also help.

Network Usage

With 1500 unique MACs connecting to the network over the week, that comes to about two devices per person, plus some infrastructure equipment.

Usage peaked on Monday, March 6, 2018 at a sustained rate of 140 Mbit down for about 1 hour in the mid-day, but generally stayed in the 80-120Mbps of downstream traffic range for most of the daytime hours of the conference, tapering off to 20-30 Mbps in the late night and early morning hours.

Overall, it seems that total number of connected devices per person has gone down in the past year, likely due to an increase in functionality of cell phones and a fading fascination with smart watches and wrist-based connections.

Here are some fun graphs.

Typical Usage in-session.

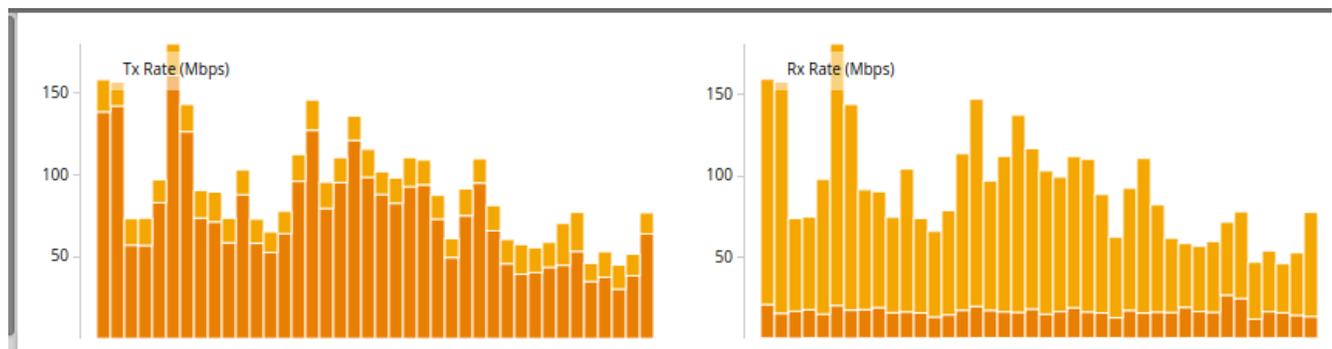
Notice the really consistent 80-120 Mbits of usage, with little 160Mbit spikes here and there. This is actually almost 50% higher general utilization than last year's July, 2017 plenary in Berlin, Germany.

Network planning for the IEEE 802 meetings should include an estimate of ~150Mbits of available throughput at this point. 200 Mbit is an excellent ceiling with room for rare spikes of high bandwidth use.

By the end of 2019, this may rise to a need of ~ 220-250Mbit if the trend continues.

The PSAV team offered us space on their 500 Mbit link burstable to 1 Gigabit with utilization showing a utilization level of ~150Mbit at any given time. That gave the IEEE 802 ~350Mbit of guaranteed bandwidth to work with, of which we needed less than half.

Light Orange – incoming, download bandwidth in Mbits
Dark Red-Orange – outgoing, upload bandwidth in Mbits



Here's a fascinating and repeating trend. Throughput dips right at the end of a session as people clear up their belongings and move to another location to plop down and catch up on work. This was about a 4 minute dip as major sessions released and people moved, but got right back on line after moving.

Light Orange – incoming, download bandwidth in Mbits
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