

BILT Meeting Networking and Convergence Technology: Trends
May 12, 2015

Matt Glover: What the future may be like. Specific trend: mobile-first strategy. 65% of internet traffic comes from mobile devices. China did not invest really at all in infrastructure. They have completely embraced the mobile future, today. The Asian market in mobile computing dwarfs what the American and European markets are doing combined. There are 785 million devices online today in China. China is really a trend setter because that is the direction that the market is moving, and we can see that in the Cloud Technology. What's going to happen is all of the Cloud Technology is going to "bucketize." We are going to go around the room and talk about different emerging markets, and what impact that will have on students and educators in the future.

Glenn Wintrich: Software defined networking (SDN) is almost overused like the cloud to where it is not really being talked about. They are talking about SDDC (software defined data center). We are seeing huge advantages to SDDCs. We started on the virtualization. We are moving to the business aspect. It will change the way that we look at mobile devices, wi-fi, etc. It could be 3-4 years before we see it hit the markets, but I think that we will see these products in the next year. Companies like: IBM, Cisco, Juniper Networks and others like them will probably be the first to put items on the market. It will change the way that people coming out of IT school will have to look at their job in 4-5 years.

Matt Fearin: I think the change has already occurred. We have ratified sanction cloud technology to be an acceptable platform. It has dramatically changed things like innovation. We're heavily engaged in adaptive design thinking. There is nothing about our business that looks the same way that it did ten years ago or even two years ago.

Vincente D'Ingianni: I'd like to add into all of this. We are throwing around the name NFV (network function virtualization) and SVN and Cloud. I'm looking at some of the knowledge domains that we have here. I'd just like to emphasis network virtualization, taking applications and virtualizing. SDN is just a new way to provide routing. It still needs to run on hardware somewhere. When you break those three concepts down, if we cover those three things in the domain, those are the things that I'm looking forward to.

Kurt Wall: In the innovation group we will be doing a lot more on sensors over the next 100 years. If you put on a pair of roller skates and turn around and look at the complexity of the mind, and all of the sensors that are working to with that to make that work. You get a kid and they get it automatically, you get an adult and they say "I can't do that." So what you are doing is you are applying the sensors so that you can fulfill what is needed. As you do that, the innovation center is going to be pushing a lot of sensor technology; for the cloud and other technology. As this world changes, we took 7 years at T.I. and Raytheon ideas, and condensed them down to a year. Speed up, we now have a month. If you have an idea, you now have a month to initiate it and somehow get it out to the market.

Bill Morgan: I just want to comment on that. There are a couple of different components in that: one, the technology components. The trends that we have seen over the last couple of years is if it's the commodity functions of in the organization, things tend to gravitate towards the virtual environment. And two, risk management. If students are given the opportunity to understand and identify risk—we're seeing a lot of programs on insurance—this could help with protecting corporate intellectual property. If you expose the risk, it could be detrimental to the company.

Matt Glover: Here's a shocking stat: Every day in Western Europe and America, there is a loss of \$20 Billion dollars due to intellectual property being hacked. At some point, the competitive advantage that America and Western Europe has will be evaporated.

Glenn Wintrich: What we used to say if you're still getting hacked, spend more money (buy a new firewall, put up another layer of security). Now, our security consultants are saying you've probably spent too much money on security already. You need to start spending money on how to remediate after you've been hacked to minimize the damage.

Mohammed Ali: Spending money is not the only solution. We need to identify all of the security points. We talk about cloud computing. There is a place in the hardware pipeline where you can pull your data out into your network. That is where we need security measures. There is a design aspect: cloud computing, tunneling, and trusted network; there could be a course for students in this area. Identifying points where we need to inject the prevention systems. And we can virtualize it.

Glenn Wintrich: Off-site disaster recovery. The first time you had a failure, it was because there was no one who had a plan in place. How do you remediate failure after you've been compromised?

Bill Morgan: A lot of times, these things are not exercised because executive leadership teams do not decide to exercise it. They never really test the fail backside. The major oil companies try to get as much preventive measures as possible. They're focused on compartmentalization of risks. The area that is extremely difficult for us to protect is in memory. Things at the Asic level or the chip level. I'm not sure if students are being taught things on the bios level, but it something that really needs to be paid attention to.

Glenn Wintrich: Wind River, they have integrated security at the bios level.

Matt Glover: I think Intel's purchase of McAfee is a good testimony because they are trying to do exactly that.

Ann Beheler: Pete and Mike and maybe Jeff can comment on this...I'm surprised that we are not designing networks from the get-go that have all of the security invested in them already. I'm surprised that cybersecurity is a separate entity. Other than one has to design a network, and there is a lot that goes into making it secure. I don't know how you put it all into one curriculum. It's my supposition that there is still too much to fit into 60 semester hours. We just had our National Visiting Committee meeting, and their comment was that you need to focus on cybersecurity as well. I said well there are

Cyber Security Centers that really focus on that, and I don't think that we want to go there politically. But the comment was, well you still need cybersecurity. I said well, we'll integrate it. But the problem is still that 60 hours is 60 hours is 60 hours and that's all that we can do.

Matt Glover: I think that it is too hard to control it all. I'll give you some real business experience that I have. I have engineers all over the world developing products for Andy Macs. I gave them a private cloud that is secure. Only they can log-in to it. Everything that they shared is time stamped. Does that mean that they can't take a screen shot and that it is completely secure? No. I wanted to make it as secure as I could, though. What's fascinating is—no matter how much money you spend—there's always going to be smart people that will circumvent what we do. The point of authentication is where we need to focus. Drum it down to the smallest point, and that's what we need to secure.

Jeff Palmer: The only problem is if I'm sitting on my Linux, I'll piggyback everything I want to do off of your authentication.

Matt Glover: That's the wonderful thing when we talk about single sign-on or simplified sign-on. I get it, but that's our end road. Because if we do like we did in the 80s and try to control it all, we end up not controlling at all. People will find a way around it, if it is not convenient for them.

Lynn Mortensen: It goes back to recognizing the activity, and realizing when it is not normal activity and attacking it.

Matt Glover: I think that we all agree that cybersecurity is important. Whether it is AV, IT, or networking technologies we can talk about what we want to accomplish in security with the 60 hours we have to work with. My company is coming up with AV as a service. When you go out and type in *aaS in a Google search, it comes up as who cares in a search. Between Dell, Microsoft, Cisco, and someone else they are building more data center space for cloud computing than all of the other companies combined. The whole idea is to transform us into a new direction. In the old war between Tesla and Edison, between a DC and an AC, who won? The AC won, Tesla won, because you had a central capability of having power and it could be disseminated out across everywhere. Those are trends that will be hitting our students and how can they play. The next biggest thing is sensors everywhere, like Kurt said. What do sensors do? They provide data. Data is useless if it cannot be turned into an action. How can we ready those students if they want to be data scientists. We have to explain how it all stacks from Bachelor's degree to Doctorates.

Kurt Wall: One thing that is a valid business model is how are you going to gain your value? Google is now finding out that advertising might be dwarfed compared to data analytics. You want to be able to do preventative analytics. We are looking past prescriptive and looking at descriptive. If you are an insurance company, instead of home insurance why do you not specialize in home protection? Selling protection for their home and self-insuring. It is going to change the insurance industries business model.

Matt Glover: John Deere and Caterpillar are putting sensors in their tractors, specifically to do what the planes are doing.

Lynn Mortensen: Several universities have data analytics degrees. UT Arlington just unveiled their senior house that is filled with sensors. It can track walking patterns and could determine if there is something wrong with the hip or other things.

Glenn Wintrich: From predictive to prescriptive data analytics. It'll change the insurance business model.

Ann Beheler: Time check. We were supposed to finish the Trends session 30 minutes ago. May I suggest that we move on to Job Skills Analysis.

Candy Slocum: We will be adding seven IT positions on our targeted occupations list of 53. What we are suggesting that all technical schools look at for their programs. We have a list—it is important because it doesn't have to be approved by anyone, but comes directly from companies that have identified jobs they will need—EE to be specific. I have 34 of the 65 emerging occupations that will be IT or STEM. We have started a project that two chairs started that looks at what causes the Trends jobs to become trends. In the future you will have to look at these emerging trends. It is on our website and easily accessible. The first thing that they said is, "Security must be considered in everything that happens with IT." Second, "When you walk out of this room, these trends will probably be obsolete."

Glenn Wintrich: We are waiting for two more reports to come out. We've done IT, Healthcare, and Construction. The things that are coming out of it, is the skill sets that we need these students to have. It centers around critical thinking, problem solving, collaboration. If you really want to focus on what we need our students to have when they graduate (K-12, Bachelor's, Master's, Doctorates) the skills that they are getting are not the ones that they can Google. Thomas Friedman said, "We don't hire people because of what they know—because Google knows more than they know—we hire them for what they do with what they know."

David Pope: What I have seen in the last five years is that we have come to every professional certification after another, and they each ask are you teaching them critical thinking, problem solving, documentation, and communication skills.

Matt Glover: The most magical IT staff that I have ever had the pleasure of leading are those people who can see root cause analysis through the mist of technology. There are some people that are not just a systems engineer, but are also a network engineer, an application development person. They can identify configuration, networking, and a code in the application problem. They understand it at the foundational level. If we can teach that at the community college, those foundational elements, then all of these trends that we are talking about today will be easy.

Glenn Wintrich: It's the student portfolio. How do they show that they can solve a problem?

Ann Beheler: We had the virtual internship last week. It was fabulous. Two of the seven students were deaf. They presented a presentation that was wonderful. The business professionals in the room could only ask very targeted questions that were meaningful.

Mohammed Ali: I think something that is particular to what we are doing. We are hiring a lot of people, and we are asking them to do the fiber and wireless connectivity. We are learning on the job. If we can have some skills in the graduating classes like splicing, engineering processes, etc.

Ann Beheler: Are you saying that you want a project in every course?

Glenn Wintrich: I think that is a great aspiration, but it is not realistic. We need the step in the process that says one of the goals in this course is the following skills will be exercised in this course. I think when you want someone to remember something you have to help them apply it.

Matt Glover: The entry level classes are focused on what a router does and what a switch does, difference between a server and a PC unit. What we are saying is that once you get the basic skills hammered out, and they need to deliver something, deliver it in a manner that they can put it in a portfolio. Deliver it so that they can go into an interview and say I built that ____, I remember when I did that ____. It does not matter if it was real or virtual. Stack activities over the course.

Lynn Mortensen: I think most of that is already in the course work; albeit might not be stated as such. It might not be that we need to completely rework the course work, but just overlay that this is what you are doing. Most students do not know that they should bring these things up in interviews. Help the student articulate it. Help them prepare their story.

Glenn Wintrich: We talked about that last year. Clearly communicating what the students will be learning in the course in ways that they can relate that to future careers.

Jeff Palmer: I'm not interested in someone's story. When I hire someone, I want someone that can impress me. I want someone that can communicate with me and tell me what it is that I need to know. In a course, there are a lot of entry-level courses that teach this is a command line. If I'm teaching you Linux, I have to teach you scripting or it won't make sense. What is important is creating a capstone course, after two or three semesters where we say you've had all of the facts; now let's build.

Ann Beheler: In the courses you took 20 years ago, the very basic networking class I would offer that it is difficult for people to go through a capstone course, and that be their first experience in building and working with others.

Matt Glover: I don't want the whole point to be lost. We build the projects in components in different course. The capstone brings each component together so that you can display that you understand it.

Bill Morgan: The one thing that it has to be connected to is business value. Business is moving from privates and commodities to a big global roll-up. Everybody wants annuity streams. It's like one big bank would create a transaction. How do you reduce the cost of a transaction?

Helen Sullivan: I think everything we've been saying is a part of the puzzle. It goes back to the systemic thinking that we mentioned earlier. The student has to be able to put everything together.

Jeff Palmer: I hire technicians. The biggest part for them is knowing the lingo. I want someone that can talk the talk. If you can't talk the talk, I sure as hell will not hire you to walk the walk.

Bill Morgan: Whatever this portfolio is, it needs to work. It needs to be a live working system. I would love for these students to find the best jobs with the best companies, but if they don't find these jobs, for them to be the next best employee. They have a live prototype, and we could get them funding quickly.

Lynn Mortensen: I think many people, when they interview people, want to know that the individual understands the job. At the Raytheon company, it was found that the cost to hire that employee is \$100,000. I want to know that the employee can do that work, but also what they can do.

Matt Glover: When I served on a tech submarine. I had to get certified for the submarine. I had to interview in front of a panel of different departments. I was asked what the difference between a leak and a flooding. I gave the text book answer, "If the water that comes into ship exceeds the pump capacity, you now have flooding." The Master Chief said, "Let me tell you the difference, son. A leak you find. Flooding finds you." Do you understand why the things you are learning are important, or are you just memorizing?