



Advanced Engineering Task Force Meeting Agenda

March 20, 2015
10:00 a.m.



Advanced Engineering Task Force Meeting Agenda

Meeting Name: Advanced Engineering Task Force (AET) Quarterly Meeting

Meeting Date, Time, Location: March 20, 2015 - 10:00 a.m.

Video Conference Facilities:

Springfield, 120 W. Jefferson, Chicago, JRTC 9-036, DeKalb NIU

Audio Bridge#: 888-494-4032 Access Code: 8940539699

AET Members

	Jim Flanagan		Robert Dulski		Anita Nikolich		Glenn Trommels
	Scott Armstrong		Brandon Gant		Jim Peterson		Ed Wagoner
	Andrew Bullen		Rich Kulig		Alan Pfiefer		Robert Zschernitz
	Troy Brown		Herb Kuryliw		Michael Shelton		
	Alex Cline		Joe Mambretti		Tracy Smith		
	Mike Dickson		Brian Murphy		Brian Tobin		

AET Staff & Guests

	Lori Sorenson		John Leonard		Robin Woodsome		Frank Walters
	Adam Ford		Essam El-Beik		Michelle Medley		Valerie Bolinger

“X” for Attendee “A” for Audio Attendee “V” for Video Conference

Topic	Presenter
1. Introductions/Roll Call	Jim Flanagan
2. Review Agenda, Approval of Minutes <ul style="list-style-type: none"> • October 3, 2014 Minutes • January 16, 2015 Minutes 	Jim Flanagan
3. Old Business <ul style="list-style-type: none"> • Budget Update • PARCC Update • On-Net vs. Off-Net Testing 	Robin Woodsome Jim Flanagan ICN Staff
4. New Business <ul style="list-style-type: none"> • ICN Rates & Allocation Letter • Network Update • Update on ICN/Illini Cloud • Software Defined Network (SDN) • Campus Cyber Infrastructure Data Networking & Innovation Program 	ICN Staff Jim Flanagan Joe Mambretti Anita Nikolich
5. Other Items	Jim Flanagan

Next Meeting: May 15, 2015 – Heartland Community College, Normal, IL

ILLINOIS CENTURY NETWORK

October 3, 2014 Advanced Engineering Task Force (AET) Minutes

Submitted for: Action

Summary: Distribution of the October 3, 2014 minutes for review by the AET

Action Requested: Adoption of the October 3, 2014 minutes

Recommended Motion: The AET adopts the October 3, 2014 minutes with any edits as noted

Advanced Engineering Task Force Meeting Minutes October 3, 2014

Introductions/Roll Call

At 10:08 a.m. the Advanced Engineering Task Force meeting was convened by Jim Flanagan, AET Chairman who welcomed everyone. Jim proceeded with roll call.

Members Present:

Name	Affiliation	Location
Jim Flanagan-Chair	Illini Cloud	Audio Bridge
Scott Armstrong	Kishwaukee Community College	Heartland CC
Andrew Bullen	Illinois State Library	Audio Bridge
Robert Dulski	Brookfield Zoo	Heartland CC
Brandon Gant	CARLI	Heartland CC
Herb Kuryliw	Northern Illinois University	Heartland CC
Brian Murphy	Eastern Illinois University	Audio Bridge
Alan Pfeifer	Sauk Valley Community College	Audio Bridge
Raj Siddaraju	CC Presidents Tech Council	Audio Bridge
Tracy Smith	University of Illinois	Heartland CC

Members Absent:

Name	Affiliation
Troy Brown	IL Heartland Library System
Mike Dickson	Western Illinois University
Rich Kulig	College of DuPage
Joe Mambretti	Northwestern University
Anita Nikolich	National Science Foundation
Jim Peterson	Bloomington S.D./Illini Cloud
Michael Shelton	Southern Illinois University
Brian Tobin	DeKalb CUSD 428
Glen Trommels	City of Rockford
Ed Wagner	Chicago Public Schools
Rob Zschernitz	The Field Museum

Staff & Guests:

Name	Affiliation	Location
Lori Sorenson	Central Management Services	Audio Bridge
Robin Woodsome	Central Management Services	Heartland CC
Frank Walters	Central Management Services	Heartland CC
Adam Ford	Central Management Services	Heartland CC
Essam El-Beik	Central Management Services	Heartland CC
Valerie Bolinger	Central Management Services	Heartland CC
Michelle Medley	Central Management Services	Heartland CC

Meeting Minutes - Jim Flanagan, AET Chairman

Jim Flanagan recommended a correction for the August 18, 2014 meeting minutes. The AET meeting date should be corrected to reflect October 3, 2014. Jim called for approval of the meeting minutes with the correction. A motion was made by Allen Pfeifer to approve the minutes as corrected. The motion was seconded by Andrew Bullen. The minutes were approved.

Budget Update - Lori Sorenson, Central Management Services

Lori Sorenson reported that Central Management Services (CMS) requested \$6 million but received \$1 million in General Revenue Funds to subsidize bandwidth for the schools, libraries, museums and higher education for FY2015. For now, we will continue to provide credits based on the \$6 million. If the budget cut extends beyond FY15 we will need to revisit the credits.

Jim Flanagan stated that we should consider organizing an ICN Day to reach out to our current customer base and encourage them to communicate with their local legislators regarding the recent budget reductions. We need to emphasize how this cut will be detrimental to educational programs and students. The process itself will help inform our customers about important issues and allows them to feel like they are part of our movement. This could also trigger the General Assembly's attention to our issue.

In response, Herb Kuryliw and Allen Pfeifer agreed they would endorse and publicize an ICN Day by engaging their customers. Lori commented that participation would be needed by AET in order to make a difference.

Brandon Gant noted that CARLI has similar funding concerns. CARLI drafted and mailed "value letters" to their Library Directors. The one page letter contained an informative update about CARLI services and the benefits of their services. In response to the letter, Library Directors stated the communication was beneficial and enlightening. Brandon will provide a sample of the letter to the ICN for review.

PARCC Update - Jim Flanagan, AET Chairman

Jim Flanagan reported that schools have completed PARCC online forms for the Illinois State Board of Education (ISBE). Jim provided an electronic copy/example of the PARCC document for committee review. The regular administration of testing includes electronic computer based testing. Robin Woodsome commented that PARCC testing is scheduled March 9 through May 22, 2015.

New Business

ICN Rates Presentation - Essam El- Beik, CMS

Essam requested that members refer to the ICN rates presentation handout and explained that slide two described the current landscape of the ICN. Slide four and five summarized our current recommendations to address the \$ 5 million reduction in state appropriation and explains how we will facilitate the expansion of broadband with our customers. Removal of the free allocation will have the greatest impact on the small schools and libraries.

Essam stated that the ICN will encourage all schools and libraries to take advantage of E-rate and will be conducting a webinar in the near future. Various pricing scenarios were analyzed. Staff looked at the potential revenue from the current customer base and predicted the revenue based on the percentage of customers that stay with ICN if these recommendations are adopted.

Lori provided possible last mile connection solutions:

- Our focus will be centered on building fiber to additional CAIs. The target audience will be schools and libraries covered by E-rate. The cost can be amortized which will enable us to provide a service that is eligible for E-rate reimbursement.
- We are currently pursuing arrangements with private partners in different parts of the state that will share the build cost. This will help expand our footprint. Collaborating with private partners allows them to take the lead role for construction.
- We will continue to use Metro-Ethernet service offerings and leverage those services with various vendors.
- Provide end to end relationship, even if we have to rely on Metro-Ethernet as a service provider. Our customers will only have to deal with the ICN.

Essam commented that the ICN is developing a SIP service. Although rates have not been established yet, we anticipate we can offer the service at a lower cost than what ICN customers are currently paying. We anticipate that this structure will create the tipping point for our customers. Manteno currently has SIP trunking and will serve as our proof of concept. Another significant cost savings of SIP trunking is that any phone call made within the ICN network or to another entity connected to our network via SIP will be a free call.

Jim Flanagan commented that once SIP rates are available we should bundle and market quickly. AT&T will be introducing new service offering that will replace their traditional telephone services. School districts are looking for other options for their current telephone services. If we wait too long, we may lose these districts. They may sign into long term contracts for SIP services with other businesses.

Essam emphasized, when the ICN starts supporting SIP, reliability and redundancy will become very important for customers. After speaking to school IT Directors, many stated they were looking at installing SIP and VoIP service on their networks.

Brandon Gant requested information about customer trending for the ICN. What type of customers are leaving the ICN? In response, Robin Woodsome stated, low bandwidth entities that cannot afford Metro-Ethernet connectivity and are seeking other solutions. In most cases, these entities select a cable modem type service. They include K-12 schools that require more bandwidth than what they receive through their allocation. Pricing is the important factor for this particular group and they will traditionally select a provider that is less expensive.

Brandon Gant requested trending information about libraries. In response to the question, Robin Woodsome commented that many libraries are purchasing commodity Internet for the public access computers and using the ICN connection for the administrative computers

Essam El-Beik provided copy of the Commercial Service Provider Rates Sheet for committee review. Essam stated that we are considering a price reduction for Commercial Service Providers as well. The pricing for Internet egress and 10GB Ethernet wave will be decreased to match market rates. If we are going to sell in a commercial market place, we need to provide competitive pricing aligned with current market rates.

Jim Flanagan asked for a motion to approve the recommendation of the proposed service pricing. A motion was made by Andrew Bullen to approve the new pricing. The motion was seconded by Bob Dulski. The motion carried.

Network Update - Frank Walters, CMS

Frank provided the following updates:

- ICN is currently in a position to begin implementation and testing On-Net versus Off-Net with a customer.
The 100G circuit to Starlight is operational.
- ICN is moving forward with a DDoS protect service Frank provided current statistics on DDoS recent attacks and noted that the DeKalb outage was a direct result of a DDoS attack.
- Monthly network performance stats will now be posted to the website.
- ICN is moving forward with AT&T usage based egress model. As a result of the RFP, we were able to establish better pricing, as well as, usage based pricing.
- Work for Macomb to Moline via Galesburg is ongoing. We are considering the WIU campus or possibly Blackhawk campus.

Other Items

Jim Flanagan asked if any members would be interested in serving as Co-Chairman for the AET committee. If interested, please contact Jim directly.

Jim Flanagan commented that last year the ICN, gathered feedback concerning network performance and PARCC testing through customer interviews. A report was created for the Policy Committee. We should consider soliciting for this type of information again.

The next AET meeting is scheduled for January 16, 2015. Jim Flanagan called for a motion to adjourn the meeting. Andrew Bullen made a motion for adjournment. Allen Pfeifer seconded the motion. The meeting was adjourned at 11:25 a.m. The motion carried.

ILLINOIS CENTURY NETWORK

January 16, 2015 Advanced Engineering Task Force (AET) Minutes

Submitted for: Action

Summary: Distribution of the January 16, 2015 minutes for review by the AET

Action Requested: Adoption of the January 16, 2015 minutes

Recommended Motion: The AET adopts the January 16, 2015 minutes with any edits as noted

Advanced Engineering Task Force Meeting Minutes January 16, 2015

Introductions/Roll Call – Jim Flanagan, AET Chairman

At 10:00 a.m. the Advanced Engineering Task Force meeting was convened by Jim Flanagan, AET Chairman who welcomed everyone. Jim proceeded with roll call.

Members Present:

Name	Affiliation	Location
Jim Flanagan-Chair	Illini Cloud	Video Conference
Scott Armstrong	Kishwaukee Community College	Audio Bridge
Andrew Bullen	Illinois State Library	Video Conference
Troy Brown	IL Heartland Illinois University	Audio Bridge
Alex Cline	CC Presidents Tech Council	Audio Bridge
Mike Dickson	Western Illinois University	Audio Bridge
Robert Dulski	Brookfield Zoo	Video Conference
Rich Kulig	College of DuPage	Audio Bridge
Joe Mambretti	Northwestern University	Audio Bridge
Brian Murphy	Eastern Illinois University	Audio Bridge
Anita Nikolich	National Science Foundation	Video Conference
Jim Peterson	Bloomington S.D./Illini Cloud	Audio Bridge
Alan Pfeifer	Sauk Valley Community College	Audio Bridge
Michael Shelton	Southern Illinois University	Audio Bridge
Tracy Smith	University of Illinois	Audio Bridge
Brian Tobin	DeKalb CUSD 428	Audio Bridge
Glenn Trommels	City of Rockford	Audio Bridge

Members Absent:

Name	Affiliation
Brandon Gant	CARLI
Herb Kuryliw	Northern Illinois University
Ed Wagner	Chicago Public Schools
Rob Zschernitz	The Field Museum

Staff & Guests:

Name	Affiliation	Location
Lori Sorenson	Central Management Services	Video Conference
Robin Woodsome	Central Management Services	Video Conference
Frank Walters	Central Management Services	Video Conference
Adam Ford	Central Management Services	Video Conference
Essam El-Beik	Central Management Services	Audio Bridge
Michelle Medley	Central Management Services	Video Conference

Meeting Minutes - Jim Flanagan, AET Chairman

Jim stated the October 3, 2014 meeting minutes are not available and will be presented at the March 2015 meeting.

OLD BUSINESS

Budget Update - Lori Sorenson, Central Management Services

Lori reported that there is currently no change to the budget appropriation. The appropriation remains \$1 million in General Revenue Funds to subsidize bandwidth for the schools, libraries, museums and higher education for FY2015.

Rates

The Policy Committee adopted the recommendation that was presented at the October 2014 meeting.

- Remove the free allocation, replace with standard pricing for bandwidth
- Introduce minimum purchase amount of \$140 for 10Mb/s
- Develop on-net and off-net service offerings
- Update commercial pricing for Internet Egress

Lori stated the Policy Committee recommendations have been presented to the Central Management Services' Director Office for approval. Due to administration changes in state government, it may take a while before we receive approval to implement the new rate recommendations.

PARCC Update - Jim Flanagan, AET Chairman

Jim reported that PARCC has performed stress tests with Illinois schools along with checking network capacity. A few problems were reported related to firewalls. Possible future DDoS attack issues may be encountered during real time testing scheduled in March.

On-Net vs Off-Net Testing for Customers – Frank Walters, Central Management Services

Frank reported that staff have identified Kishwaukee College and the College of DuPage as ideal organizations to test the On-Net versus Off-Net service. Testing was successful in a lab environment and we are ready to move forward with a couple sites.

NEW BUSINESS

E-Rate Update - Essam El-Beik, Central Management Services

Essam requested that members refer to the E-rate handout that was provided in the email package sent earlier in the week.

On December 19, 2014, the Federal Communications Commission (FCC) released a second Report and Order on E-rate modernization building on the first Report and Order released July 23, 2014. The second Order aims to close the gap in high speed broadband connectivity to schools and libraries and increases the E-rate funding cap to \$3.9B indexed to inflation. Illinois Department of Central Management Services (CMS) contributed to the record and comments provided by CMS are referenced by the FCC in this Order. The FCC has recognized a substantial lack of broadband infrastructure exists, particularly in rural areas, to connect schools and libraries to high-speed broadband. The rules detailed in the Order aim to address this by providing additional options for schools and libraries to connect to high-speed broadband that include purchasing dark fiber and self-construction. The rules also include changes to how broadband construction is funded by E-rate, with the effect of easing the financial burden on applicants. The Order also increases the E-rate cap to \$3.9B indexed to inflation, allowing all Category 1 requests to be fully funded and targeting \$1B for Category 2 requests.

CMS encourages all schools and libraries in Illinois to apply for E-rate funding for both Category 1 and Category 2 services for Funding Year 2015. With the increased options available to schools and libraries for the construction of broadband, CMS encourages schools and libraries to develop a strategy for bringing high speed broadband to their premises, preferably via a fiber connection and apply for E-rate funding for this in either Funding Year 2015 or 2016.

CMS is well positioned to help schools and libraries benefit from E-rate modernization as detailed in the two E-rate Modernization Report and Orders released last year. CMS can help by:

1. Providing advice and expertise on internal Wi-Fi architecture for schools and libraries
2. Sell dark fiber in addition to lit services currently sold to E-rate applicants
3. Construct a direct fiber connection to the school or library and making available either dark fiber or lit service
4. Lighting school owned dark fiber
5. Leading an E-rate consortium of schools and/or libraries for Category 2 funding

Network Update - Frank Walters, Central Management Services

Frank asked Taskforce members to review the Network Update sheet provided. The two illustrations provide an overall view of the bandwidth consumption for the last 12 months and the month of December. Monthly network summary reports are now posted on our website.

Egress - Frank reported that the order has been placed for the usage based bandwidth. We expect it to be operational in two to four weeks. We estimate this model will save approximately \$480K a year.

DDoS Attacks - Frank reported staff are moving the AT&T DDoS Protect into production. He commented that there is not a threshold with this service, it is a heuristic system. In most cases, AT&T will send notification of an issue before the customer even notices. The ICN will monitor anomalies in traffic and check high packet irregularities in order to mitigate the problem. Adam Ford stated that we are testing an internal product to handle DDoS attacks that start on our network, from a peer or another provider. Frank noted that it is a free product. If we experience an issue, and the system catches the issue, we have the ability to immediately stop the attack on the customer side.

Backbone Update - Frank commented that there are no changes to the backbone outside of our regular planned maintenance window. The network was 100% operational last month.

An order was issued to the engineering firm begin looking at the leased fiber path along the Eisenhower. The path is only partly lit due to gaps in the fiber. Lori commented that we have been working with Chicago Transit Authority (CTA) to lease additional fiber strands from the JRTC to Skokie and to Evanston.

Procurement & Contracts – Frank stated that we have 20 months left on the Cisco contract and the renewal is currently in process. We are moving forward with the GIS mapping and fiber tracking software.

Resilient Ethernet Protocol (REP) – Frank stated that REP is a Cisco proprietary implementation of a VLAN span tree/ring. REP is designed to allow customers to take the quickest route to their distribution router with a 50ms fail over for an alternate path. Customer requirements would include the purchase of 10G equipment. The ring speeds are shared (10G max).

Network Manager Introduction – Lori introduced the newest member of the ICN team, John Leonard. John is the new manager of the Network group and will oversee the day to day duties of the network design and operations group.

OTHER ITEMS

Illini Cloud Update – Jim Flanagan, AET Chairman

Jim commented that they are exploring new ways to deal with constituents in regards to the new rates. Now that items are heading in a new direction, Jim recommended that this topic be tabled until the next meeting.

Software Defined Network – Jim Flanagan, AET Chairman & Joe Mambretti, Northwestern University

Joe provided background information regarding Software Defined Networking (SDN). SDN is a technique that is becoming very popular among networks. SDN is deeply programmable and more flexible. Joe noted that another advantage is cloud services. Cloud services are becoming increasingly important to statewide networks. Managing traffic is better with an SDN open flow approach than your standard networking. Jim recommended that board members speak with their network engineers regarding the SDN approach and proposed that we discuss this topic at our next AET meeting.

Jim stated that the SDN topic will be added to the agenda for the March 20th AET meeting.

Campus Cyberinfrastructure Data Networking & Innovation Program - Anita Nikolich, National Science Foundation - Anita provided information regarding the Campus Cyberinfrastructure - Data, Networking, and Innovation (CC*DNI) program. This program invests in campus-level data and networking infrastructure and integration activities tied to achieving higher levels of performance, reliability and predictability for science applications and distributed research projects. Science-driven requirements are the primary motivation for any proposed activity.

Anita stated that proposals are due in March and there are three areas of particular interest:

(1) Network Design and Implementation for Small Institutions awards will be supported at up to \$350,000 total for up to 2 years.

This is a 2 year grant that is targeted for small institutions to fund network and infrastructure upgrades within a campus. This particular category does not include libraries.

(2) Campus CI Engineer awards will be made at up to \$400,000 total for up to 2 years. This particular category funds a network engineer for 2 years and does not include 2 or 4 year colleges or small institutions.

(3) Regional Coordination and Partnership in Advanced Networking awards will be made at up to \$150,000 for up to 2 years. This category does not include museums, but the intended target audience is non-profits and 2 or 4 year colleges to serve in a leadership capacity.

Anita commented that we should encourage people to apply. NSF would like to broaden their audience to include two year community colleges, non-profits and schools who have not taken advantage of these opportunities. She also shared that Joe Mambretti had completed the process multiple times and could provide assistance if needed. The deadline for full proposals is March 24, 2015.

The next AET meeting is scheduled for March 20, 2015. Jim called for a motion to adjourn the meeting. Scott Armstrong made a motion for adjournment. Allen Pfeifer seconded the motion. The meeting was adjourned at 11:15 a.m. The motion carried.

ILLINOIS CENTURY NETWORK

ICN Network Update March, 2015

Submitted for: Information

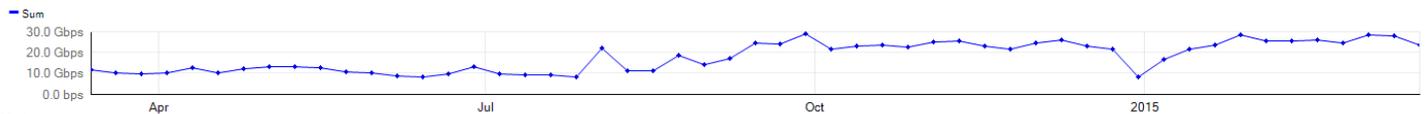
Summary: This item provides an update on the ICN Network

Action Requested: None

Recommended Motion: None

ICN Network Update March, 2015

Interface Aggregate Chart - Max bps In
Last 12 Months



2014
SolarWinds Orion Core Services 2014.2.1

Interface Aggregate Chart - Max bps In
Last Month



2015
SolarWinds Orion Core Services 2014.2.1

Egress

- AT&T DDoS Service is operational and allowing us to protect customers in a more advanced way.
 - Several schools that have already benefited. Side effect is some orders for more bandwidth.
 - Most providers do not offer this as part of their service package and certainly not at no cost.
- Proceeding with procurement for internal DDoS protection. This will cover all providers.

Backbone

- No changes.
- Outside of the planned maintenance window, the backbone has been 100% operational.

Procurements & Contracts

- Cisco Maintenance and Hardware – In Progress
- DDoS Protection for Internal customers.

Services

- On Net vs. Off Net Testing for Customers – Plan Identified
Working with Waubensee, should begin testing the week of 3/15.

Other Notes/Projects:

- **Macomb to Moline via Galesburg.**
Moline POP Site move
Builds and permitting, equipment and circuit moves moving forward.

Fiber Work / Customer Adds

- McHenry Build
Contractor is reporting that we should have test results by the week of 3/8. Several locations where the conduit was damaged, repaired by vendor.
- Greenville Community College agreement signed, no build work required
- SIUE Build
Service orders signed and build and permitting work starting. Expected to be complete by the end of the fiscal year.
- Chicago REP Turnup is on schedule. Waiting on Eisenhower path to complete the ring.
- Steady stream of splice and new customer work.

Technology Explanation: DDoS Mitigation

As most of us are aware, DDoS attacks are designed to send many packets from sources that are, or appear to be, from all over the world to a targets network in order to deny them service, bringing the site down for what could be long periods of time.

This has grown exponentially over the last few years due to the simplicity of launching an attack. (hostbooters, etc.)

Below is a presentation that was produced internally to explain the issue and what we are doing to mitigate these attacks for both ourselves and our customers.

DDoS Protect Service Overview

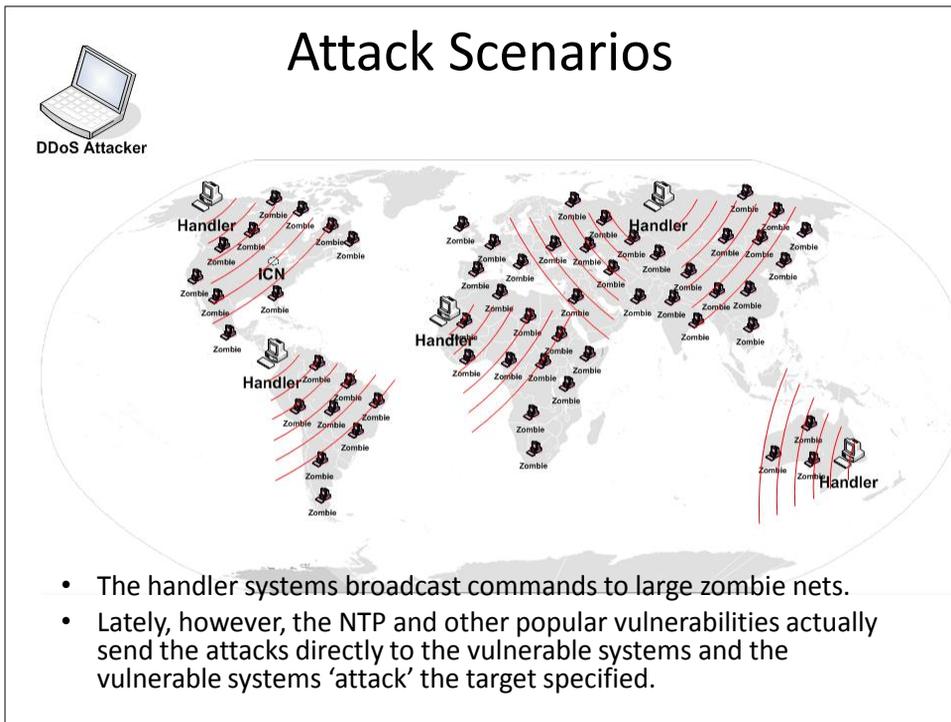
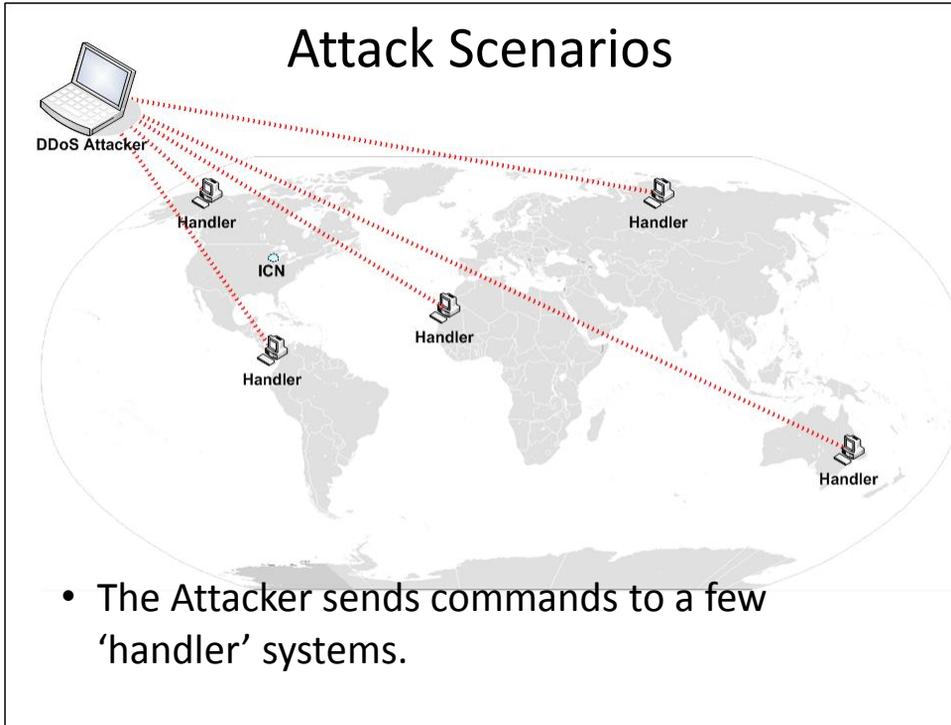


DDoS Attacker

Attack Scenarios



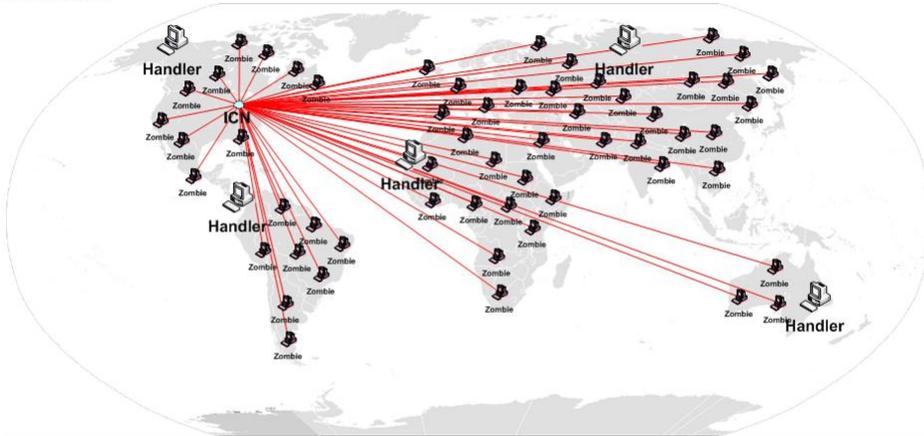
- Attackers from all over the world can be leveraged to attack the ICN and it's customers





DDoS Attacker

Attack Scenarios



- Whether Zombies, or just vulnerable, the hosts attack the intended target.

Impact

- Customer(s) are be brought down.
- ICN Bandwidth to the Internet spikes and becomes unavailable.
- This will dramatically increase Egress costs.



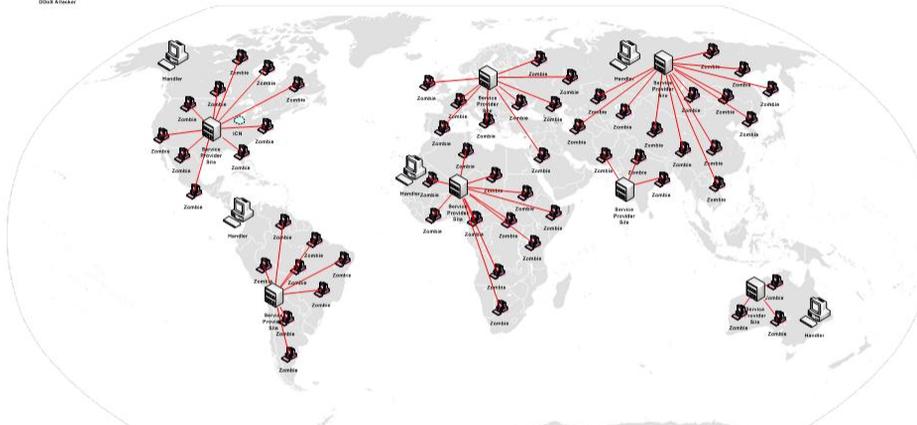
Solution



- Some providers have a Global presence (this is one of the many reasons that Tier 1 providers are important to the ICN)



Mitigation



- The Internet and DDoS Protect services allows the bad packets to be dropped near their origin, instead of on the ICN.
- This is done by intercepting the packets in the region where each attack originates, leaving ICN and the customer in a healthy state.

What this doesn't cover

- This 'global solution' doesn't cover customers attacking each other, which does happen.
- It also does not cover attacks from other providers, I2 or peers.
- Additionally, it is only proactive for customers who are routed through the provider that the service is purchased from.
 - If a customer needs to be mitigated and they are not already on the protected provider, they must first be moved to that provider before mitigation can occur.

This is why ICN staff are working to procure an internal system that can augment the cloud based system.

ILLINOIS CENTURY NETWORK

Illinois Providers Receiving USAC High Cost Support

Submitted for: Information

Summary: This item is a list of providers in Illinois receiving USAC High Cost Support

Action Requested: None

Recommended Motion: None

Providers in Illinois Receiving USAC High Cost Support

1. ADAMS TEL COOP	32. MCNABB TEL CO
2. ALHAMBRA-GRANTFORK	33. MADISON TEL CO
3. CAMBRIDGE TEL CO -IL	34. MARSEILLES TEL CO
4. CASS TEL CO	35. METAMORA TEL CO
5. CLARKSVILLE MUTUAL	36. MID CENTURY TEL COOP
6. CROSSVILLE TEL CO	37. FRONTIER-MIDLAND
7. FRONTIER-DEPUE	38. GALLATIN RIVER COMM.
8. EGYPTIAN COOP ASSN	39. MONTROSE MUTUAL TEL
9. EL PASO TEL CO	40. MOULTRIE INDEPENDENT
10. C-R TEL CO	41. FRONTIER-MT. PULASKI
11. FRONTIER OF LAKESIDE	42. NEW WINDSOR TEL CO
12. FLAT ROCK TEL CO-OP	43. ODIN TEL EXCH INC
13. FRONTIER NORTH, INC.	44. ONEIDA TEL EXCHANGE
14. GENESEO TEL CO	45. FRONTIER-ORION
15. GLASFORD TEL CO	46. FRONTIER-PRAIRIE
16. GRAFTON TEL CO	47. REYNOLDS TEL CO, INC
17. GRANDVIEW MUTUAL TEL	48. FRONTIER-SCHUYLER
18. GRIDLEY TEL CO	49. TONICA TEL CO
19. HAMILTON COUNTY TEL	50. VIOLA HOME TEL CO
20. SHAWNEE TELEPHONE CO	51. WABASH TEL COOP, INC
21. HARRISONVILLE TEL CO	52. WOODHULL TEL CO
22. HENRY COUNTY TEL CO	53. STELLE TEL CO
23. HOME TEL CO-ST JACOB	54. CITIZENS-FRONTIER-IL
24. FRONTIER NORTH, INC.	55. FRONTIER COMMUNICATIONS OF THE CAROLINAS, INC.
25. IL CONSOLIDATED TEL	56. ONEIDA NETWORK SERVICES, INC.
26. FRONTIER OF ILLINOIS	57. DIVERSE COMMUNICATIONS, INC.
27. KINSMAN MUTUAL TEL	58. UNITED STATES CELLULAR CORPORATION
28. LA HARPE TEL CO	59. ILLINOIS VALLEY CELLULAR RSA 2 - I
29. LEAF RIVER TEL CO	60. ILLINOIS VALLEY CELLULAR RSA 2 - II
30. LEONORE MUTUAL TEL	61. CELLULAR PROPERTIES DBA CELLULAR ONE OF EAST CENTRAL ILLINOIS
31. MCDONOUGH TEL COOP	