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## University of Alaska Office of Information Technology Network Capacity Overview FY05-FY15



Presented By:

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## **Presentation Objectives**



- Network Overview
  - Benefits
  - UA Network Growth & Investments FY05-FY10
  - Monitoring Mechanisms and Data
  - Network Expenses
- Identify Efficiencies and Cost Containment
- Compare Urban and Rural Costs
- Provide Analysis of Utilization
  - When, where and how to upgrade bandwidth?
  - How do Community Campuses fit into the mix?
- Summarize Managed Growth Plans FY12-FY15

## **Network Benefits**



#### Prospective Students & the Public

Discover & obtain information via the network about the University of Alaska

#### Enrolled Students

Register for classes, complete financial aid applications, find housing assignments, access progression to degree and course information, access distance education via video or Blackboard tools, perform online research, access social networks and correspond with other UA students

#### Faculty

Administer academic instruction, video conferencing and elearning (e.g. UAF/UAA Joint Psychology PhD, Nursing, School of Education, etc.), capture lectures live for later use by students, utilize online access 24x7, conduct research, publish, collaborate

#### Researchers

Collect, analyze and store research data, access and transfer to global research partners

Staff

Access wired or wireless student, conduct University business, communicate, collaborate, participate in education and training online and via video conferencing

# UA WAN



## Expense Overview & Investments

- Network service areas include the following primary categories:
  - Intrastate: UA Core WAN (between FAI ANC – JUN) and Community Campus connectivity
  - Interstate: Internet2 Research Network fees and Commodity Internet

Annual Network Costs						
FY13 UA Wide Area Network Telecommunications Costs						
<u>Interstate</u>						
Internet2 Fees	\$350,000					
Commodity Internet	<u>\$504,000</u>					
Interstate Total	\$854,000					
<u>Intrastate</u>						
Community Campuses	\$1,800,000					
(rural & urban)						
Core WAN services	\$1,142,000					
Intrastate Total	\$2,942,400					
Grand Total Inter and Intrastate	\$3,796,400					

- UA Community Campus connectivity is significantly more expensive when campuses are not on the road system or must use satellite connectivity
- UA OIT received State of Alaska increments specifically for WAN upgrades and network infrastructure in FY07 (\$700K) and FY10 (\$550K)

Gifts donated to UA have added capacity and reliability to the UA network for a fraction of the cost
•GCI bandwidth gift in FY09 valued at \$30M (10 yr. term) up to 10 GB capacity
•Space in & bandwidth to an ACS facility in Oregon for disaster recovery valued at \$6.8M (5 yr. term)



•The OIT WAN Weather Map is a dynamic, live, network traffic monitoring tool

•The data displayed within this tool can be used to make operational changes to traffic routing or to inform strategic plans for capacity growth or change

•The weather map is online at: http://weathermap.sw.alaska.edu



Trends indicate a fairly consistent WAN expense over time while utilization of the FAI – ANC (most heavily used) circuit has steadily increased indicating changing technology market conditions and better rates = better bang for the buck!
As of October 2009, heavy use on the FAI-ANC circuit has begun to register as greater than 50% of the use on the entire network, although infrequent so far, this may indicate a need for planning efforts to increase capacity for this circuit

#### Reference 56 WAN Trends **UA WAN Expenses FY05-FY15** \$2,500,000 By FY15, new network providers should bring competition and \$2,000,000 lower costs to Alaska UA Core: FAI <> ANC <> JUN \$1,500,000 ----- Commodity Internet \$1,000,000 OC 12 - 24 - 48 ANC <> FAI

Interstate Subtotal

The GCI bandwidth gift necessitated corresponding increase in Internet2 fees (Interstate) in FY10
Optical circuit (OC) capacity between FAI & ANC will increase over time
Community Campus connectivity is heavily impacted by satellite rate increases in the current WAN contract while urban connectivity is progressively more affordable (even as bandwidth increases)

FY11

FY12

FY13

FY14

FY15

Millions

\$500,000

\$-

FY05

FY06

FY07

FY08

FY09

FY10

# Cost Containment: Refere A Measure of WAN Efficiency







## Bandwidth Breakdown by Service: What is UA using the network for?



•Administrative Use is defined as customer network services at Statewide

•Academic Use is defined as customer network services at MAU locations.

•Video Conferencing is defined as services labeled specifically for video services.

•Commodity Internet is defined as services labeled specifically as commodity internet.

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### **Community Campus Bandwidth**

# Urban vs Rural

#### **Terrestrial vs Satellite**

Campus	Bandwidth (Mb)	Annual Cost	
Kenai	45	\$75,000	Terrestrial
Mat-Su	45	\$73,000	Terrestrial
Valdez	45	\$75,000	Terrestrial
Ketchikan	45	\$148,698	Terrestrial
Bethel	5	\$110,000	Satellite
Nome	5	\$110,000	Satellite
Kotzebue	5	\$139,000	Satellite

# Community Campus Potential Solution Community Campus Potential

Current Bandwidth and Annualized Operating Costs

	Location	Turne	Curr BW in	Annual Cart	Bandwidth increase to	Annual cost of				
	Location	Туре	mops	Annual Cost	next level	Increase				
	Ketchikan	Terrestrial	45	\$148,698						
	Sitka	Terrestrial	45	\$128,052						
	Kodiak(campus)	Terrestrial	45	\$77,102						
	Homer(campus)	Terrestrial	45	\$74,660						
	Kenai	Terrestrial	45	\$74,656						
	Mat-Su (campus)	Terrestrial	45	\$72,510						
	Valdez	Terrestrial	45	\$74,656						
	Seward	Terrestrial	45	\$72,510						
	Kodiak (fish tech)	Terrestrial	45	\$77,102						
	Mat-Su (AFES)	Terrestrial	45	\$72,510						
	Toolik Lake	Terrestrial	45	\$90,683						
	Tok	Terrestrial	1	\$22,469	4	\$44,693				
	Homer (GI trailer)	Terrestrial	1	\$8,180	4	\$20,131				
	Barrow	Satellite	5	\$117,908	10	\$117,908				
	King Salmon	Satellite	1	\$50,213	4	\$81,822				
	Fort Yukon	Satellite	3	\$44,693	8	\$117,908				
	Bethel	Satellite	5	\$109,373	10	\$109,373				
	Dillingham	Satellite	5	\$105,194	10	\$105,194				
	Kotzebue	Satellite	5	\$138,885	10	\$138,885				
	Nome	Satellite	5	\$108,954	10	\$108,954				
					OR					
	Dillingham	Terrestrial		\$1,140,480	10	\$1,031,107				
	Bethel	Terrestrial		\$1,140,480	10	\$1,035,286				
	Kotzebue	Terrestrial		\$1,140,480	10	\$1,001,595				
	Nome	Terrestrial		\$1,140,480	10	\$1,031,526				
	Tota	\$845,000								
	Total Annual	\$4,482,000								

Table illustrates next-level network upgrade satellite costs versus terrestrial costs.



Currently, a move to terrestrial based network for our rural campus is cost prohibitive and would represent a 5-fold increase in network costs to those campuses

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Network Overview

## UA Network Reference 56 Operational Planning FY12-FY15

#### FY12

- Upgraded UA core to have an additional 45 Mbps between each MAU
- Upgraded CI to have an additional 90 Mbps for Fairbanks & Anchorage
- Upgraded Commercial Service from Pacific Northwest GigaPop (PNWGP) an additional 100 Mbps
- FY13
  - Upgraded CI to have an additional 90 Mbps for each MAU
  - Upgraded Commercial Service from PNWGP an additional 100 Mbps
  - Upgraded GCI Bandwidth gift from OC-12 to OC-24
- FY14
  - Upgrade UA core to have an additional 45 Mbps between each MAU
  - Upgrade satellite community campus service to 10 Mbps
  - Upgrade CI to have an additional 90 Mbps for each MAU
  - Upgrade Commercial Service from PNWGP an additional 100 Mbps
  - Explore Disaster Recovery (DR) options; renew ACS DR Facility gift if available
- FY15
  - Upgrade CI to have an additional 90 Mbps for each MAU
  - Upgrade Commercial Service from PNWGP an additional 100 Mbps
  - Upgrade GCI Bandwidth gift from OC-24 to OC-48

## WAN Strategic Planning



- Rural Connectivity-UA rural connectivity is limited for some locations to satellite only; most locations are 5 Mbps, at an increased cost over that of urban campuses
  - Where available and affordable, bring Community Campuses onto Terrestrial connectivity
- Explore options for redundancy and data storage by pursuing gift extensions through GCI and ACS respectively upon expiration
- Disaster Recovery-Expand UA enterprise systems located in the ACS DR facility to include improved business continuity and backup
- Encourage the addition of fiber connections to and across Alaska
- Explore network consortia where applicable and beneficial to UA

# Conclusions & Recommendations

- Demand for network bandwidth continues to grow at a steady rate
- New applications with rich media and large data sets continue to be developed and drive bandwidth demand
- UA will continue to be at a disadvantage as Lower 48 Networks increase in speed and capacity
- New fiber to the State will drive competition, expansion and new economic opportunities for Alaska

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## **Questions & Comments**

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