Los Angeles Community College District
PROGRAM MANAGEMENT SERVICES

Connect LACCD
Feasibility Study Report

Facilities Master Planning and Oversight Committee
June 16, 2014

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ConnectLACCD

LACCD identified a need to improve the infrastructure connecting its colleges, headquarters and satellite facilities

A concept was developed to deploy a District owned fiber optic network using MTA* assets.

A project validation was conducted per the Build Program's Standard Operating Procedures. This process is applied to all Build Program projects.

*Metropolitan Transit Authority

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AECOM 2
Project Objectives

ConnectLACCD Objectives:

- Support the data needs of students, faculty and staff for the foreseeable future

- Provide adequate redundancy such that the network will be only minimally affected by a disaster and can be quickly restored to support the educational process

- Use Bond funds to reduce operational costs

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Project Validation Process

1. Document project goals
2. Review existing network documentation and survey network usage statistics
3. Document technical requirements for the next generation network to meet project goals
4. Evaluate several strategies
5. Recommend a strategy to move forward

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Current State

LACCD has a network that connects its 12 locations

Consists of leased circuits, most of which are provided by the Corporation for Education Network Initiatives in California (CENIC)

Most circuits are very fast (1000Mbps*) and are backed up with a slower (45Mbps) line to each college

*Megabits per second

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Current Utilization Measurement

Current networks are 9% - 35% utilized

Pierce College 1Gbps* Link Utilization

- Typical LACCD circuit can handle 1,000 Mbps
- Typically LACCD is using less than 200 Mbps

*Gigabits per second

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Today's Usage Statistics

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Hub Site</th>
<th>B/W</th>
<th>Average</th>
<th>Peak</th>
<th>Utilization %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles City</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>350 Mbps</td>
<td>400 Mbps</td>
<td>35%</td>
</tr>
<tr>
<td>East Los Angeles</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>300 Mbps</td>
<td>380 Mbps</td>
<td>30%</td>
</tr>
<tr>
<td>Los Angeles Valley</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>250 Mbps</td>
<td>350 Mbps</td>
<td>25%</td>
</tr>
<tr>
<td>Los Angeles ESC</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>200 Mbps</td>
<td>250 Mbps</td>
<td>20%</td>
</tr>
<tr>
<td>Los Angeles Harbor</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>180 Mbps</td>
<td>260 Mbps</td>
<td>18%</td>
</tr>
<tr>
<td>Los Angeles Pierce</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>160 Mbps</td>
<td>200 Mbps</td>
<td>16%</td>
</tr>
<tr>
<td>Los Angeles Trade</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>150 Mbps</td>
<td>200 Mbps</td>
<td>15%</td>
</tr>
<tr>
<td>West Los Angeles</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>120 Mbps</td>
<td>180 Mbps</td>
<td>12%</td>
</tr>
<tr>
<td>Los Angeles Mission</td>
<td>L.A.</td>
<td>1 Gbps</td>
<td>100 Mbps</td>
<td>110 Mbps</td>
<td>10%</td>
</tr>
<tr>
<td>Los Angeles SW</td>
<td>L3 Tustin</td>
<td>1 Gbps</td>
<td>90 Mbps</td>
<td>110 Mbps</td>
<td>9%</td>
</tr>
</tbody>
</table>

Circuit utilization April 2014 – Source: CENIC
Anticipated Growth

- LACCD’s growth drivers include new and upgraded systems
  - Student information system
  - Financial system
  - Distance learning
  - Video conferencing
  - Smart Buildings
  - Student wireless devices
  - Machine to Machine
  - Smart classrooms

- LACCD’s average growth rate is trending toward 50% per year.

- In 2018, LACCD’s bandwidth needs will begin to exceed its capacity

- Current network has several single points of failure

- Existing backup links cannot support current traffic levels

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How much new capacity is needed?

Projections are based on multiple factors:

- Bandwidth used by each application and system
  - Student Information System (SIS), HR, Payroll, Financials, Etc

- Number of students, faculty, and staff at each college

- Assumed 4% student population growth (Fusion)

- Number of classrooms at each college

Assuming 50% CAGR*

<table>
<thead>
<tr>
<th>Site</th>
<th>Bandwidth required by 2020 (Mbps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East LA College</td>
<td>3000</td>
</tr>
<tr>
<td>Southwest</td>
<td>2000</td>
</tr>
<tr>
<td>Trade-Tech</td>
<td>2000</td>
</tr>
<tr>
<td>Valley</td>
<td>2000</td>
</tr>
<tr>
<td>City College</td>
<td>2000</td>
</tr>
<tr>
<td>District HQ</td>
<td>1000</td>
</tr>
<tr>
<td>Harbor</td>
<td>1000</td>
</tr>
<tr>
<td>Mission</td>
<td>1000</td>
</tr>
<tr>
<td>Pierce</td>
<td>1000</td>
</tr>
<tr>
<td>West</td>
<td>1000</td>
</tr>
</tbody>
</table>

*Compound Annual Growth Rate
Solutions

- Several possible solutions:
  - Eliminate single points of failure
  - Connect data centers at ESC* and Valley
  - Expand network service from CENIC
  - Build a point-to-point wireless network
  - Lease dark fiber
  - Construct a private fiber optic network
  - Lease network services
  - Partner with another County agency

- The optimal solution may be a combination of some of the above

*Education Services Center
Solutions – Four Potential Options

**Minimal Upgrade**
- Continue to review usage and rate of growth for the next 12 months
- Fix single points of failure now
- Lease 10GB link between ESC and LA Valley College
- Cost: ~$80k for routers plus $1,600/month for service
- Time: September 2014

**Lease network services**
- National and regional Telecommunications carriers have these services available
- Carriers have flexibility in their leasing options
- Cost: $13 million for five year lease at 10 Gbps; Bond funded
- Time: Less than 9 months
Solutions – Four Potential Options

Partner with another County agency

- PMO contacted LA County ITS* and LADPW**
- They both use leased networks due to lower cost than constructing their own private fiber network
- Master agreements with Verizon, AT&T, TWC***
- Cost: $6,850/month per 10 GBs segment
- Time: 180 days

Construct a private fiber optic network

- Current concept
- Draft MOU with MTA
- LACCD to install fiber cables in MTA pathways
- MTA gets some of the unused fibers
- Cost of easements unknown
- Cost: >$130 million
- Time: 3-5 years

*Los Angeles County Information Technology Service
** Los Angeles Department of Public Works
***Time Warner Communications

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## Summary

<table>
<thead>
<tr>
<th>Solution option</th>
<th>Goal 1 - Support current and future needs</th>
<th>Goal 2 - Redundancy</th>
<th>Goal 3 - Use bond funds to minimize operational costs</th>
<th>Maint. cost</th>
<th>Risk</th>
<th>Cost</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 - Minimal Upgrade</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Partial</td>
<td>Included</td>
<td>Very Low</td>
<td>$250k</td>
<td>September 2014</td>
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<tr>
<td><strong>2 - Leased Network</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Included</td>
<td>Low</td>
<td>$13M (5 yrs)</td>
<td>&lt;9 months</td>
</tr>
<tr>
<td><strong>3 - Partner with another Agency</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes w/long term lease</td>
<td>Included</td>
<td>Low</td>
<td>$6,850/ month/link</td>
<td>&lt;9 months</td>
</tr>
<tr>
<td><strong>4 - Private Network</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>$1.1M+/year</td>
<td>High</td>
<td>$130M+ (25 yrs)</td>
<td>3 - 5 years</td>
</tr>
</tbody>
</table>

**BuildLACCD**

*Building for tomorrow's leaders*
Findings

- No immediate change to LACCD Network is required to meet capacity demands until 2018.
- Primary single points of failure should be eliminated.
- Network enhancement is needed around 2018.
- Private fiber network has significant issues such as capital cost, maintenance cost, operational staffing cost, training and risk.
- LADPW, L.A. County and MTA use leased services per their findings of being more cost effective than building their own network.
- Local vendor proposal for a 5 year lease: cost of approx. $13M, includes implementation, network management, O&M costs, and the ability to expand. Cost may be further reduced.
- A service provider's network, such as AT&T, could be turned up in less than 25% of the time required for a private fiber network.
- Additional bandwidth from current provider could be sufficient for the expected growth through 2020 but would require each college to use operational funds.
Recommended Next Steps

- **Implement the minimal upgrade option**
  - Add new 10GB primary link between ESC and LAVC
    - Router investment: $80,000 from Measure J bond funds
    - Valley data center completion July 2014
    - ESC data center improvement completion September 2014
  - Resolve single points of failure in current network

- **Carefully monitor and document bandwidth usage for the next twelve months**

- **Define long term solution and implement:**

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**Monitor Bandwidth Usage**

- Minimal Upgrade
- Study Capacity
- Develop Solution
- Implement Solution
- Continuous Evaluation