Connected Corridors
Face-to-Face Meeting

Tuesday, April 10th , 2018 – 1:30 – 3:30 pm

Pasadena

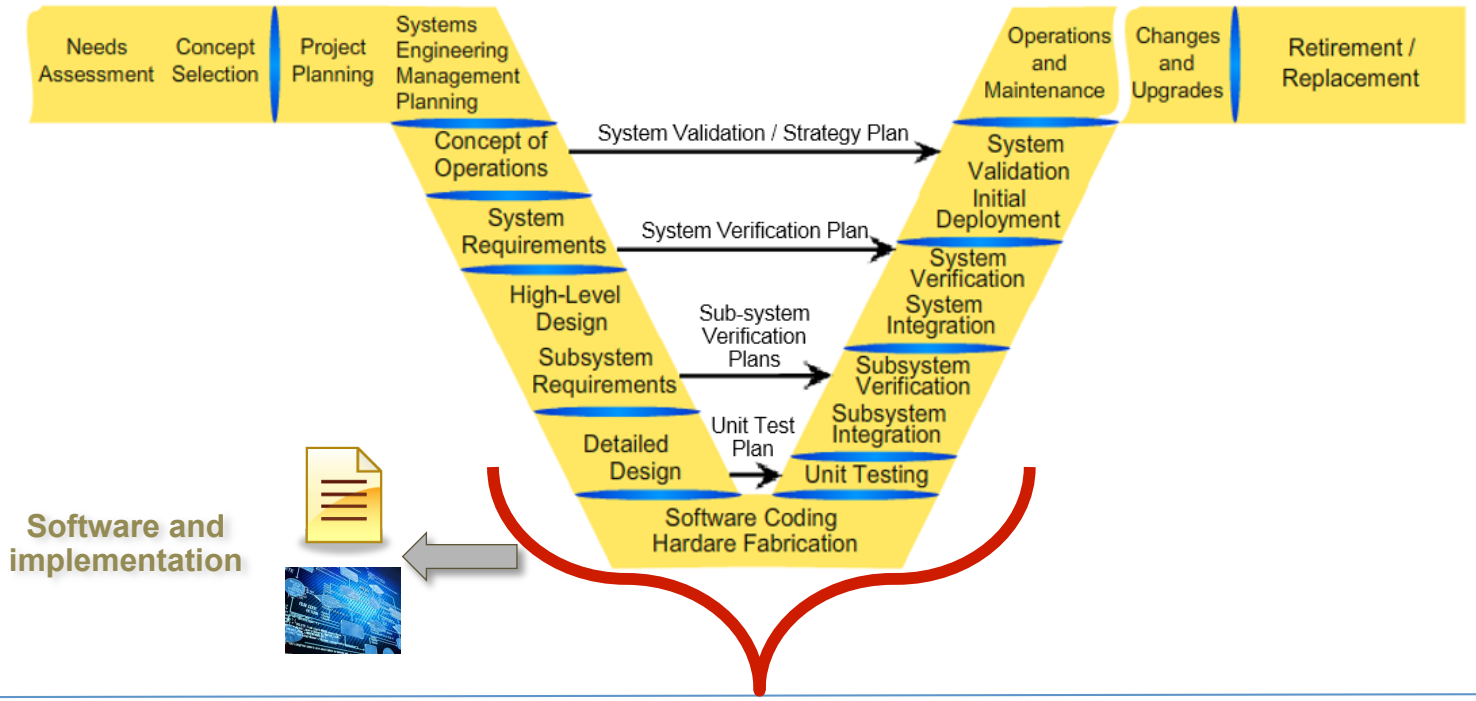
April 10th, 2018

Agenda

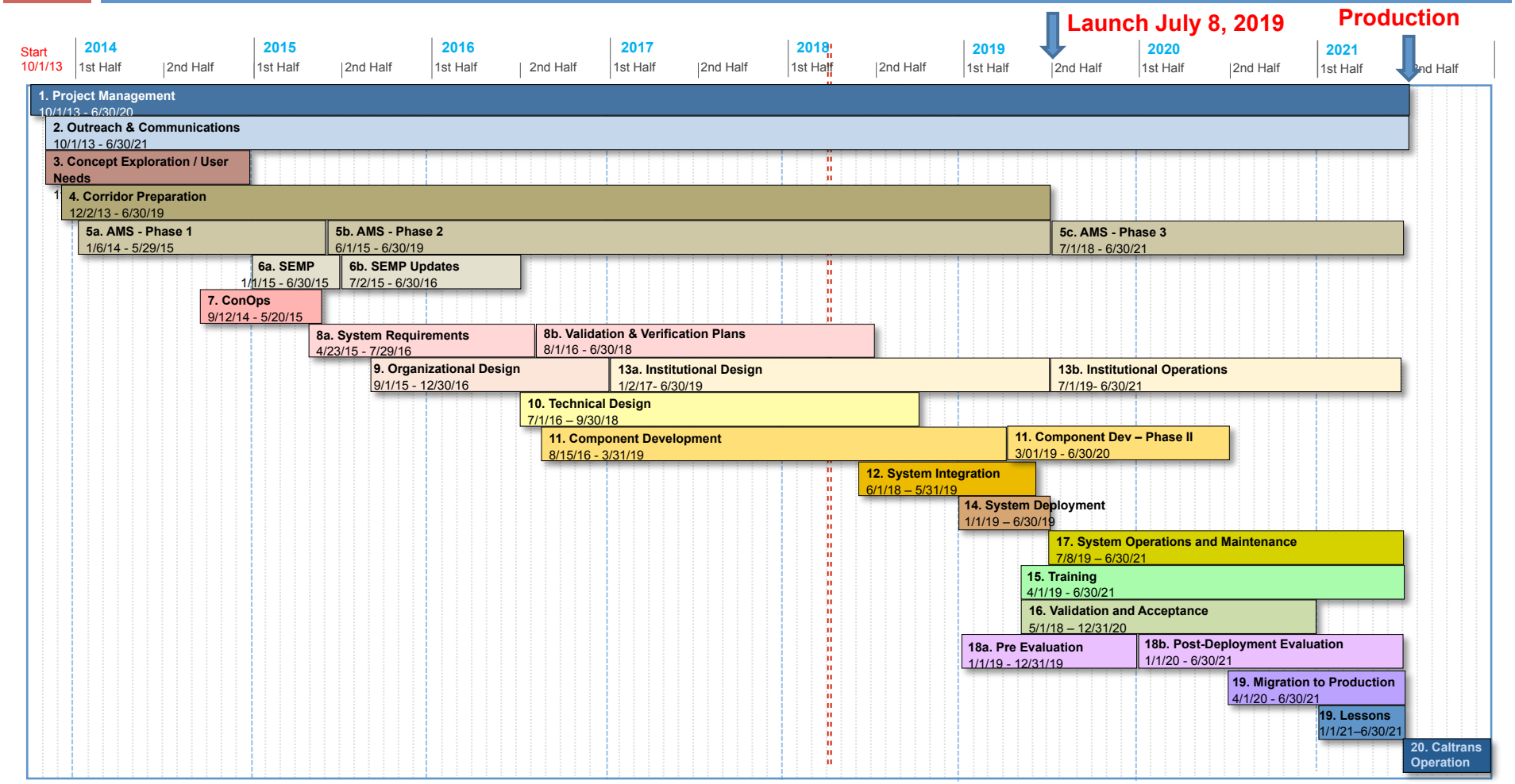
- 1:30-2:10 - Summary of program
- 2:10-2:30 – MOU - Mort
- 2:30-2:50 – Call for Projects update - Parsons
- 2:50-3:10 – Update on communications - Kali
- 3:10-3:20 – Sign update - Mort
- 3:20-3:30 – Closing – Next Meeting at D7 – May 22nd

Systems Engineering Next Steps

- Design Documents – Details of interfaces and implementations
- Hardware/Software – Building the system
- Integration – Subsystems will come on line this year



Updated Schedule



5

Summary

Human and Organizational Design

- **Nick submitted a Budget Change Request (BCP) for funding for human and consulting resources**
  - For 25 corridors in California
  - It is likely it will take time for this to be approved

Signal Timings

- **Started the development of response timing plans**
  - We have created and loaded 150 plans (out of 450) into Aimsun for testing
- **Aimsun testing framework**
  - We have finished building software to permit automated placing of incidents in Aimsun.

Communication

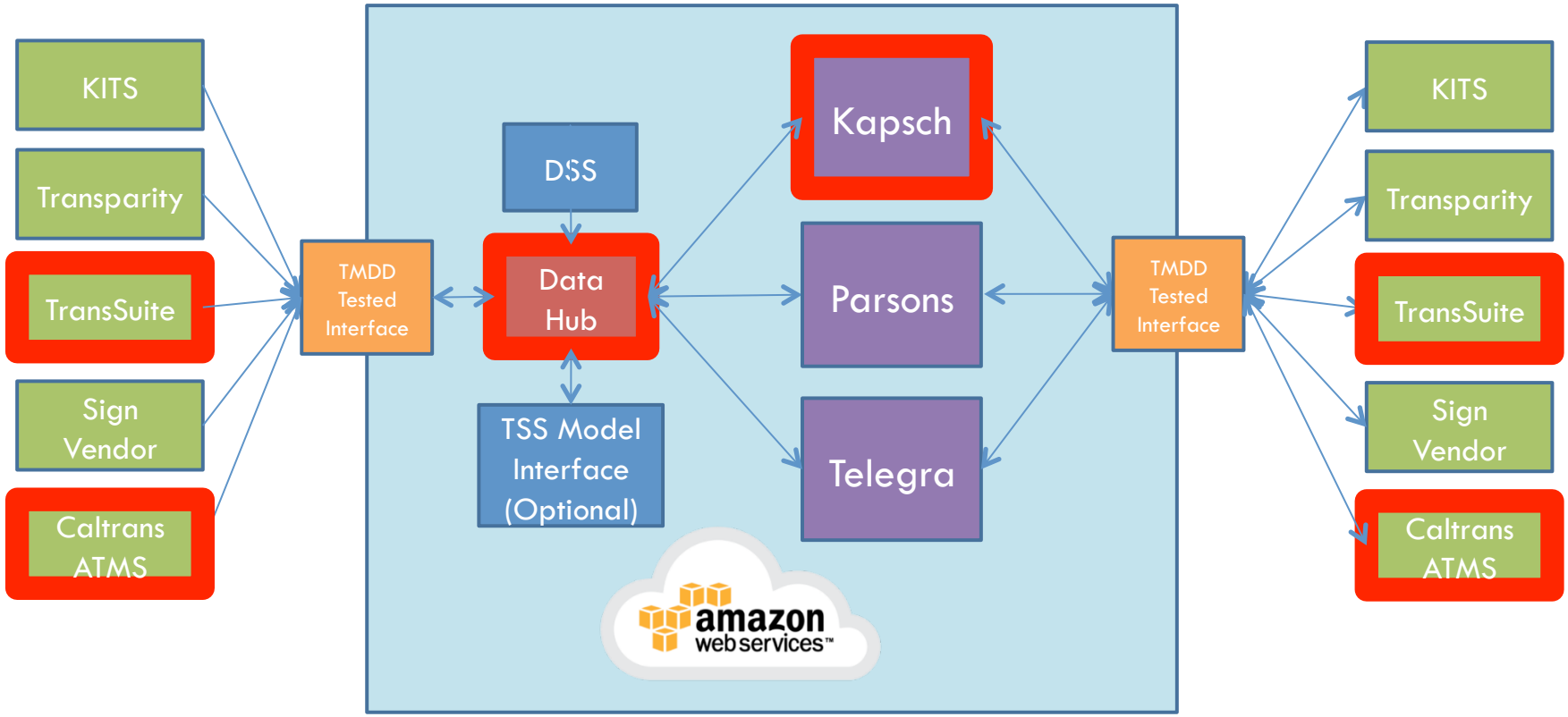
- **Cloud to Caltrans**
  - Connection between the Amazon Cloud and Caltrans D7 is up and running.
  - This is a milestone.
- **With Amahayes configuring the D7 firewall/VPN configuration we now have secure access to:**
  - The D7 TransCore server
  - D7 ATMS Test Server
- **Kali to discuss VPN and fiber interconnect later in presentation**

TMDD Interfaces to Data Hub

- **Traffic Control Systems**
  - Kimley Horn – LA County, Monrovia and Duarte
    - RFP released
  - TransCore – Arcadia and Caltrans
    - Going well
    - Provided test server
    - Initial test delivery scheduled for April/May
  - McCain - Pasadena
    - Caltrans working on contract

- **ATMS – Caltrans (CMS Signs, Ramps)**
  - Test plan delivered by Parsons
  - On track for a June delivery

C2C Interface Implementations - Status



COTS (Purple Box) - ICMS

- **Companies who are participating:**
  - Kapsch – Kick off meeting in early May
  - Telegra – Planning to participate in testing of Transcore and ATMS interfaces
  - Parsons – Awaiting results of Transcore testing

- **Update**
  - Still awaiting responses to RFI on rough system costs. Should be soon.

Data Hub and DSS Software

- **Focus on the Transcore and Parsons C2C interface**
  - Management
  - Design, test, deployment discussions
  - Building out of the data pipelines to support testing
  - Refinement of response plan TMDD structure
- **Continuing to automate system deployment in anticipation of moving components to the Caltrans' Amazon cloud**
- **DSS Interface**
- **Performance and maintenance improvements in our SPARC cluster**

Design and Construction

- **210 TMS Upgrade - Allen**
- **Call for Projects (ITS Elements) – Allen**
- **Call for Projects – Signs and Sign Software**
  - To be discussed in detail later by Mort

PEMS Usage Scenario Meeting

- **PEMS is the performance measurement and comparison subsystem of Connected Corridors**
- **Would like to meet with interested stakeholders to ensure the product does what is needed**
- **Will be setting up a meeting for April 25th in Arcadia**

MOU
Mort

Call for Projects
Parsons

Communication Kali

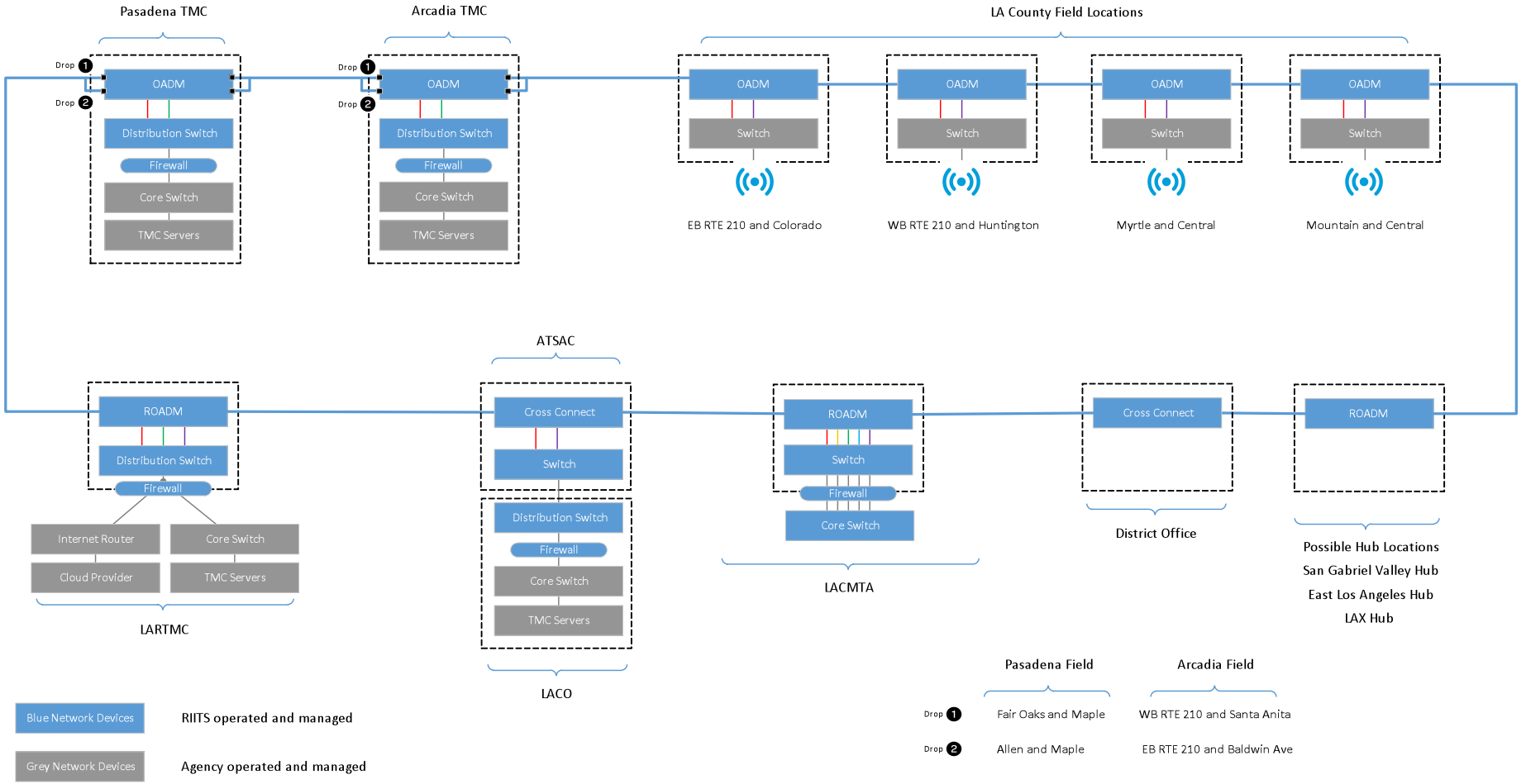
Status Update

- **VPN between City of Arcadia and Caltrans**
  - Connect traffic control system via Transcore software to Caltrans
  - Implement IP connection to Caltrans
  - Design IP management plan
  - Complete physical fiber connections between Arcadia and Caltrans
- **VPN between City of Pasadena and Caltrans**
  - Connect traffic control system via McCain software to Caltrans
- **Connection between County of Los Angeles and Caltrans**
  - Connect traffic control system via Kimley-Horn software to Caltrans
- **Completed alternate network connection to Caltrans**

Status Update Continued

- **Completed draft network section of Core System High-Level Design document**
- **Obtaining additional support from Metro for bench contracts**
  - Project management and statement of work for physical fiber connection for Arcadia
    - WB RTE 210 and Santa Anita
    - EB RTE 210 and Baldwin Ave
    - Arcadia fiber distribution hub
  - Project management and statement of work to furnish and install network equipment
  - Project management and statement of work for video distribution

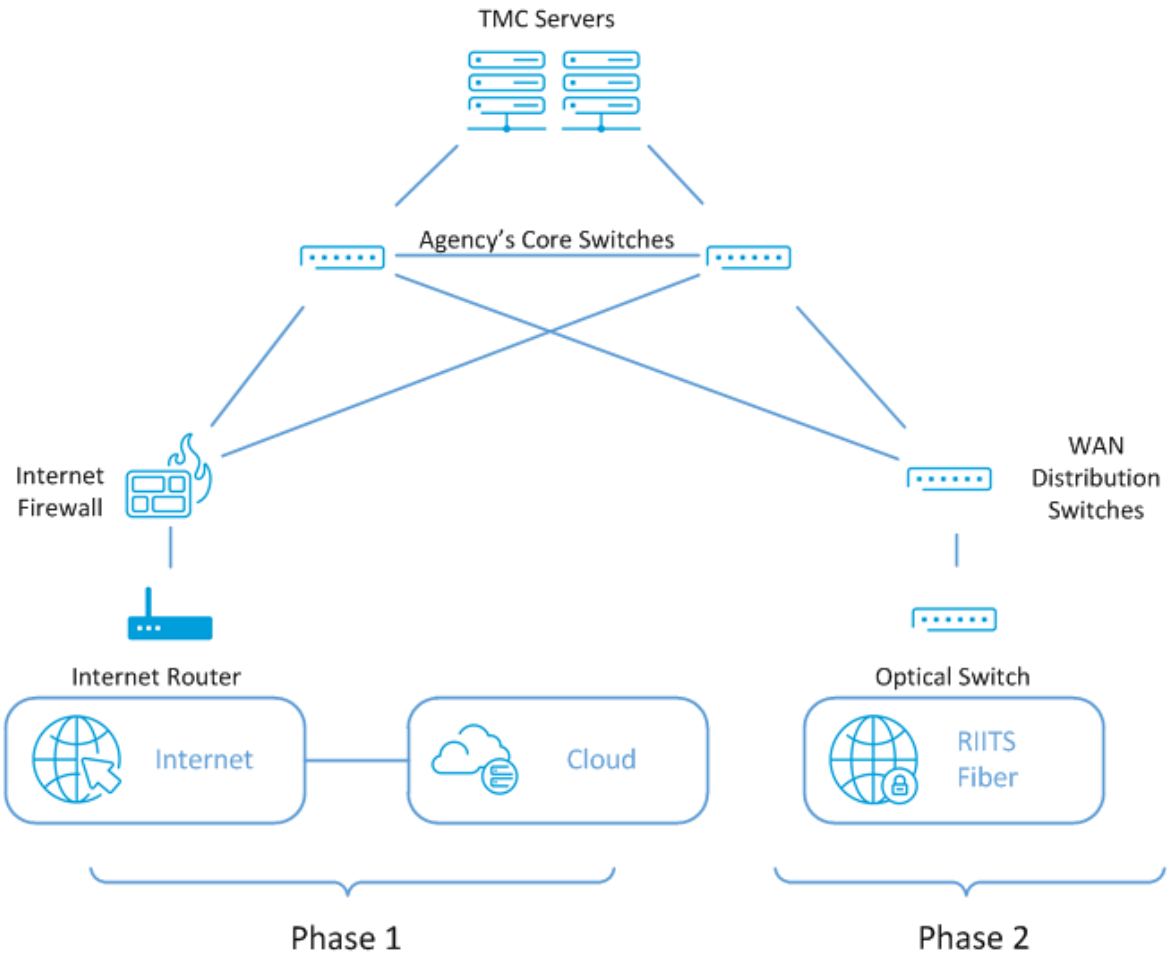
Network Components for the Fiber Infrastructure



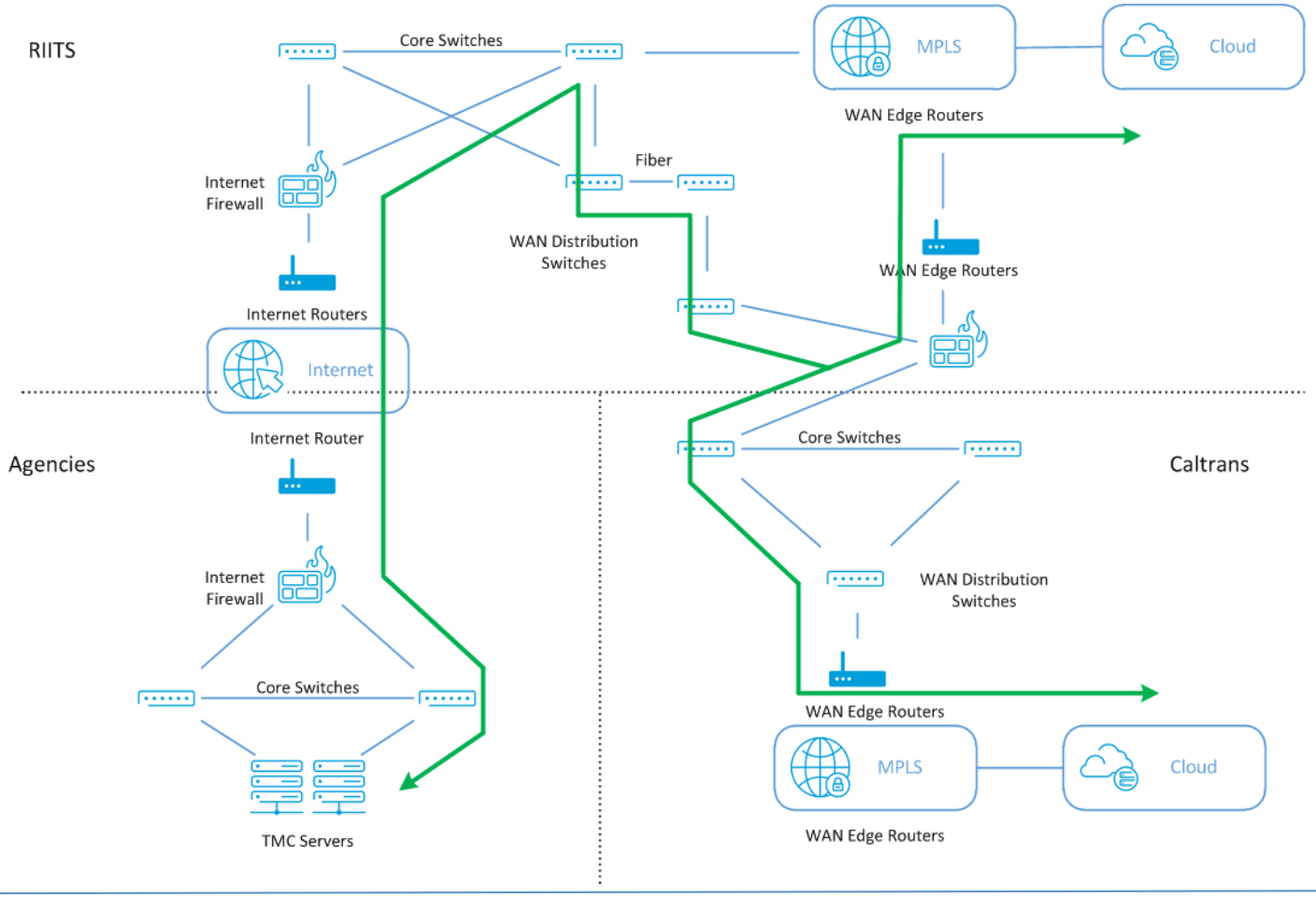
Phased Approach

- **Use existing connections to transmit traffic data to Caltrans Amazon Cloud (AWS)**
- **Phase 1 – Transmit traffic data only (no video data)**
  - Site-to-site VPN over the Internet
    - ~~Caltrans Amazon Cloud~~
    - RIITS (Required)
    - ~~Caltrans~~
  - MPLS VPN with Netbond (Completed)
- **Phase 2 – Transmit traffic data and video**
  - 10 Gbps fiber network backbone with 1Gbps bandwidth/agency

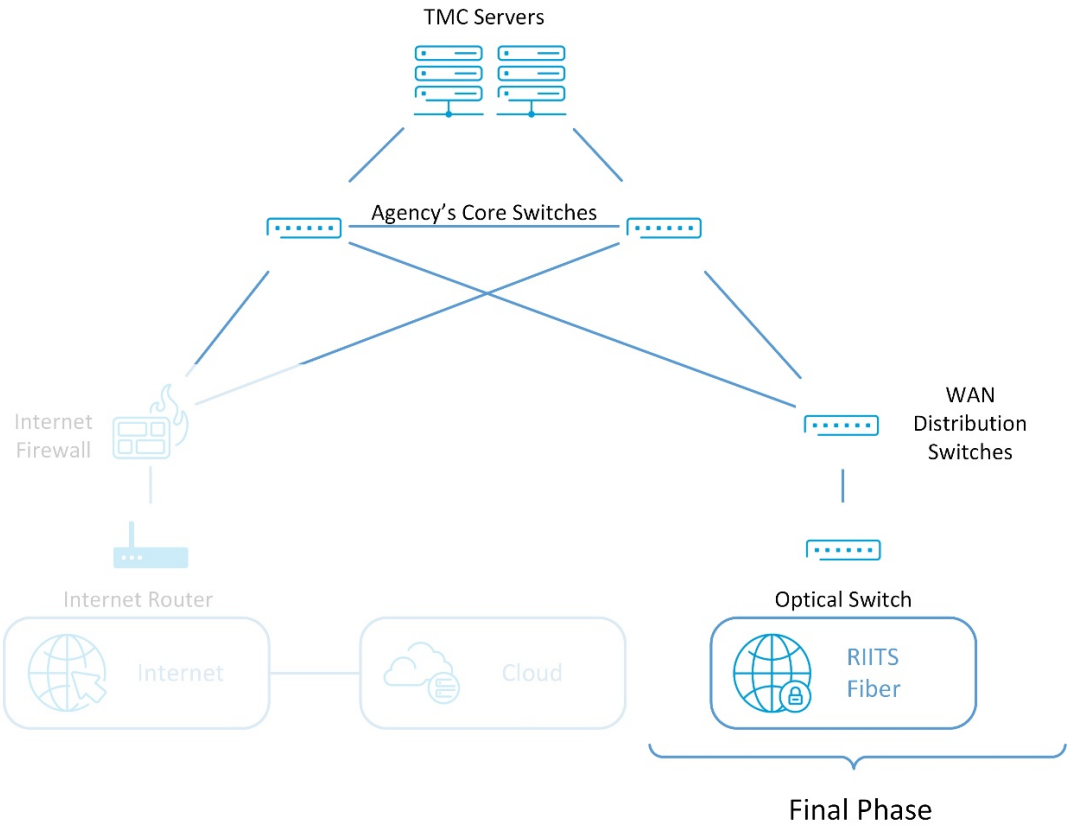
Phase 1 – Site to Site VPN



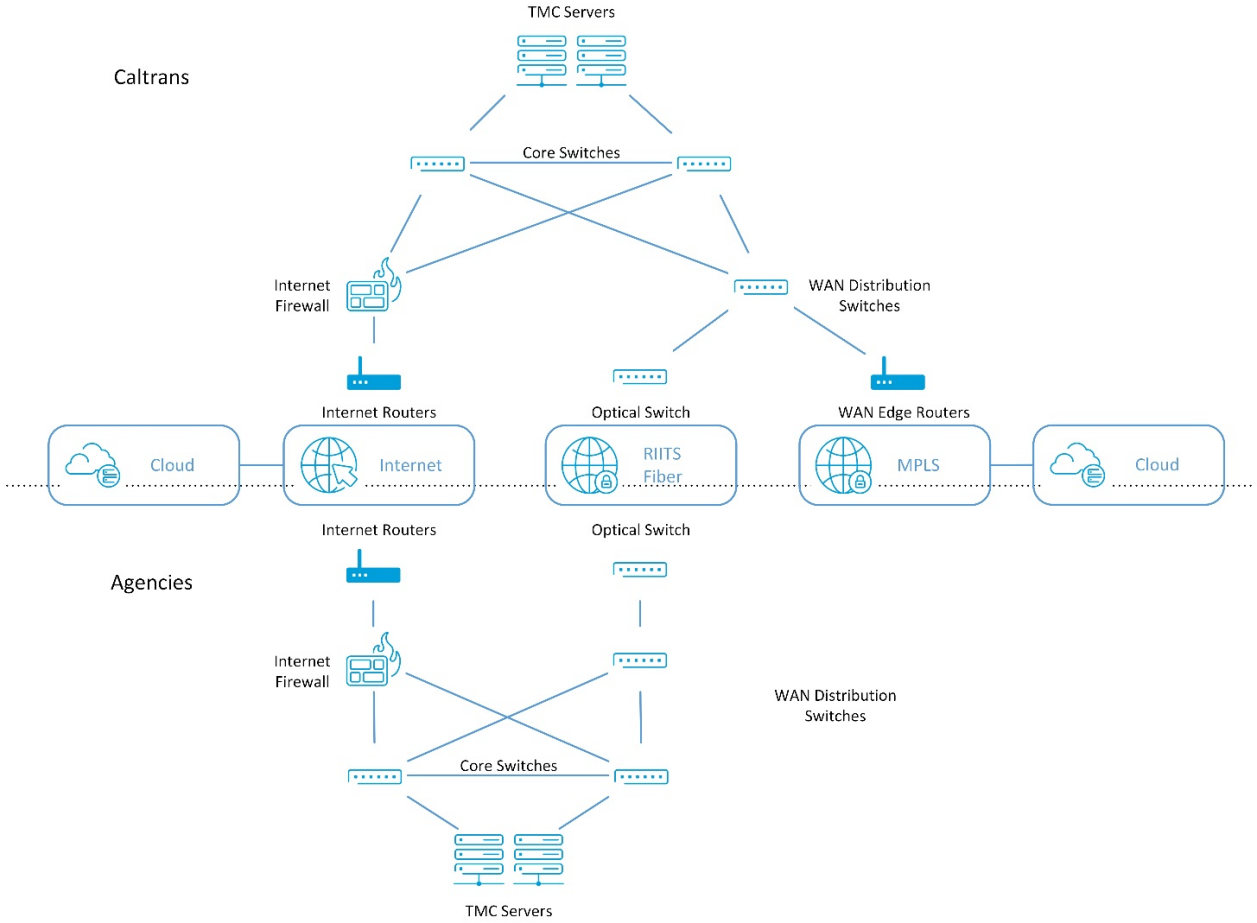
Traffic Flow – Phase 1 (VPN to RIITS)



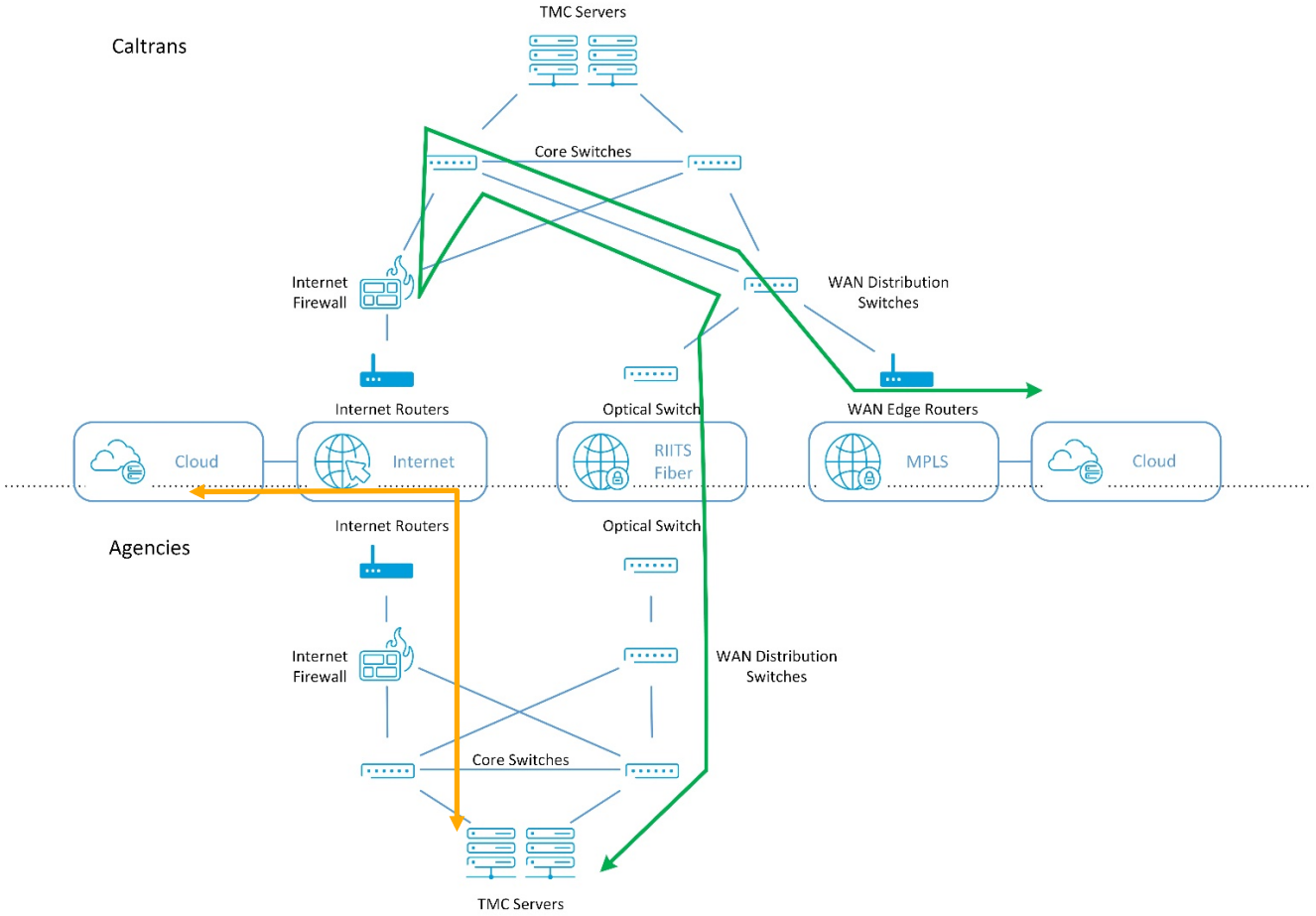
Phase 2 – Fiber Network



Transition Phase



Traffic Flow – Phase 2



Traffic Signal Bandwidth Consumption

- **Traffic Signals**
  - **Arcadia** communicates with approximately 59 intersections
    - Bandwidth consumption was observed at ~ 1 Mbps
  - **Pasadena** operated approximately 340 traffic signals
    - Traffic signal data is low and we can anticipate Pasadena's consumption based on Arcadia's data flow
      - 340 intersections / 59 intersections ≈ 6 x 1 Mbps ≈ 6 Mbps
      - 100 intersections / 59 intersections ≈ 2 Mbps x 1 Mbps ≈ 2 Mbps
  - **LACO** operates approximately 500 intersections on their KITS system
    - 500 intersections / 59 intersections ≈ 8.5 x 1 Mbps ≈ 8.5Mbps
    - 56 intersections / 59 intersections ≈ 1 Mbps x 1 Mbps ≈ 1 Mbps

Traffic Signal Bandwidth Consumption

- **Video Streaming**
  - After discussing anticipated usage with all agencies the following assumptions were agreed upon
    - Typical Camera utilization = 4 – 8 cameras
    - Max Camera Utilization = 12
  - CCTV camera bandwidth consumption can be configured
    - Assuming each camera requires 4 Mbps
      - Typical bandwidth = 16 Mbps - 32 Mbps
      - Max bandwidth = 48 Mbps
  - Video sharing, however, is typically not distributed at such high bandwidth
    - LACO streams video at 256 kbps which is a fraction of the calculated bandwidth shown above
  -

Arterial Message Signs

Sign Status

- **RFO is complete and has been provided to Caltrans for review**
- **All issues have been resolved**
- **PATH has completed mark-ups of as built drawings for use by Caltrans' project manager**

Bid Proposal Items

ITEM NO.	ESTIMATED QUANTITY	ITEM (Per Exhibit A, Scope of Work)
1.	36	Dynamic Message Signs, including labor, communication, power, materials to mount to pole, and traffic control
2.	36	Modified VDS pole (see plan), including labor and materials to install
3.	36	Pull boxes, including labor and materials to install
4.	10	Wireless communication between new signs and controller cabinets, including labor and materials to install
5.	9	Static painted signs
6.	1	Join and Extend of fiber conduit at one location in Arcadia. See Section C, No. 10.
7.	4	Training Sessions
8.	4	Installation, testing, and training as specified for the Sign Control Systems in Attachment 5
9.	4	Servers/Computers to run traffic software
10.	2	Dual Wireless Radios – required at two locations for line of sight challenges as shown in Attachment 2 (Central at Myrtle, Central at Mountain). See Section C, No. 8.

Equipment List Sample (Arcadia)

Each municipality has an accompanying procurement list and set of aerial photos

Intersection	Wireless Comm. Installation Includes Two Radios	Power Cable (ft) Including Installation from Sign to Cabinet	Communication Cable (ft) Including Installation from Sign to Cabinet	Communication Extender Including Installation in Cabinet	Wireless Network Switch Including Installation in Cabinet and All Connections
Foothill at Baldwin South		520	520	1	
Huntington at Santa Clara (EB)		375	375	1	
Huntington at Santa Clara (NB)		300	300	1	
Huntington at Santa Anita		390	390	1	
Foothill at Santa Anita (WB)		300	300	1	
Foothill at Santa Anita (NB)		340	340	1	
Foothill at Baldwin North [CALTRANS]		325	850	1	
Total		2,550	3,075	7	

Intersection	Sign Includes Mounting on Pole, Installation of both Power and Communications	Pole Includes Foundation, Installation	Pull Box Includes Installation and Securing All Necessary Wiring	New Breaker Includes Installation in Cabinet	
Foothill at Baldwin South	1	1	1	1	
Huntington at Santa Clara (EB)	1	1	1	1	
Huntington at Santa Clara (NB)	1	1	1	1	
Huntington at Santa Anita	1	1	1	1	
Foothill at Santa Anita (WB)	1	1	1	1	
Foothill at Santa Anita (NB)	1	1	1	1	
Foothill at Baldwin North [CALTRANS]	1	1	1	1	
Total	7	7	7	7	

Aerial Sample

Hatched box = sign location

Red dot = controller location

Foothill at Baldwin South - Arcadia

Location 224 W' of Stop Bar, 5' W of Pull Box
Power is through existing conduit to controller cabinet
Communication through existing conduit to controller cabinet

Thank You
and
Next Meeting
(Suggest May 22nd
at District 7 downtown)