

APTA TCIP Standard

September 2010

Agenda

- TCIP Overview
- TCIP Support Tools
- TCIP Tool Demos
- Current TCIP Implementations

TCIP

- Transit Communications Interface Profiles
- TCIP standardizes data exchange to promote interoperability between transit system components
 - Between office systems
 - Between office systems & field / station controllers
 - Between office systems & vehicles
 - Amongst onboard equipment
- TCIP is a balloted and approved APTA Transit Standard

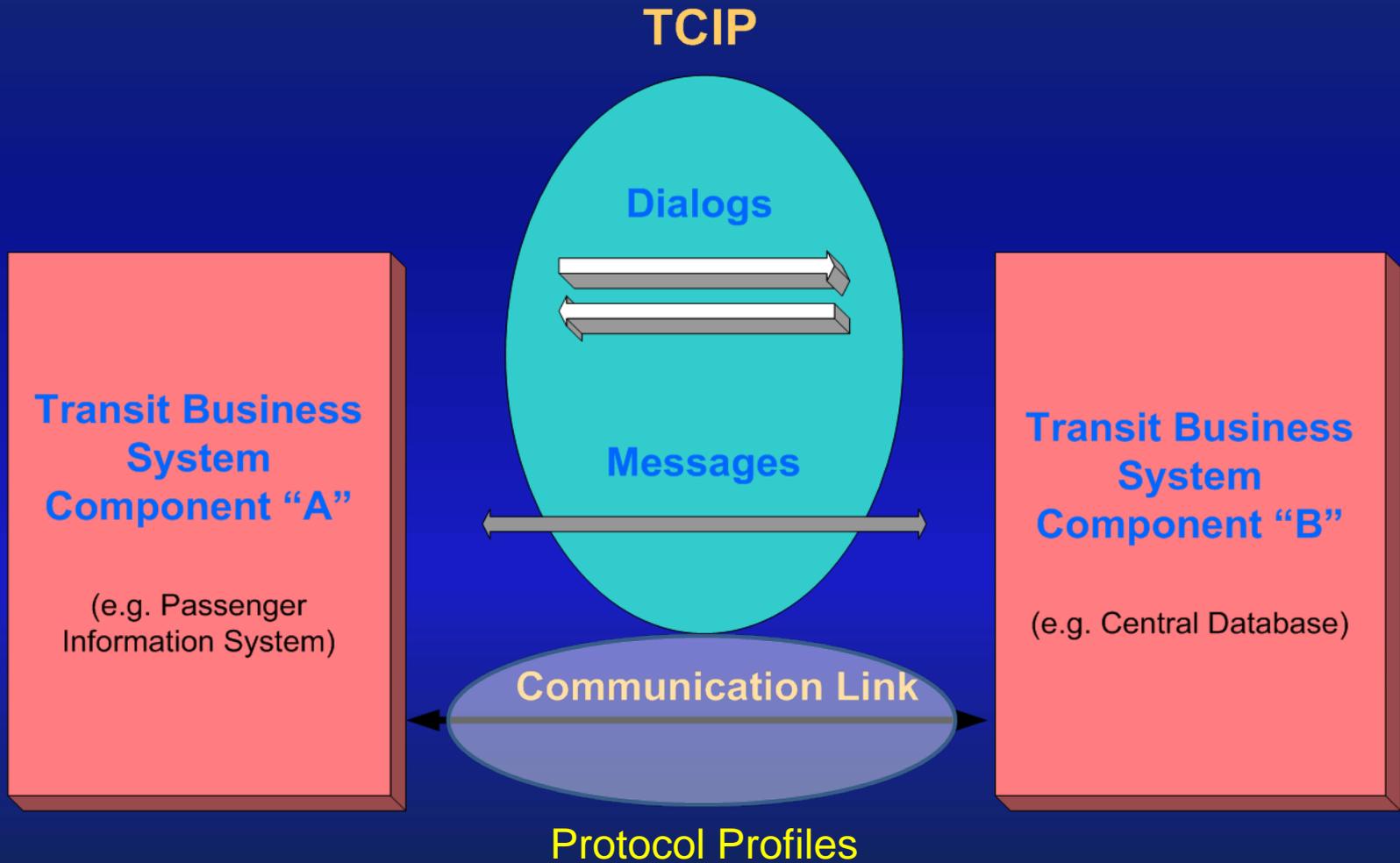
Why TCIP?

- TCIP provides standardized building blocks from which to specify the information exchange across an interface
- TCIP encompasses the collective experiences of hundreds of transit professionals
 - Transit agency personnel from agencies both large and small
 - Vendor personnel
 - Consultants

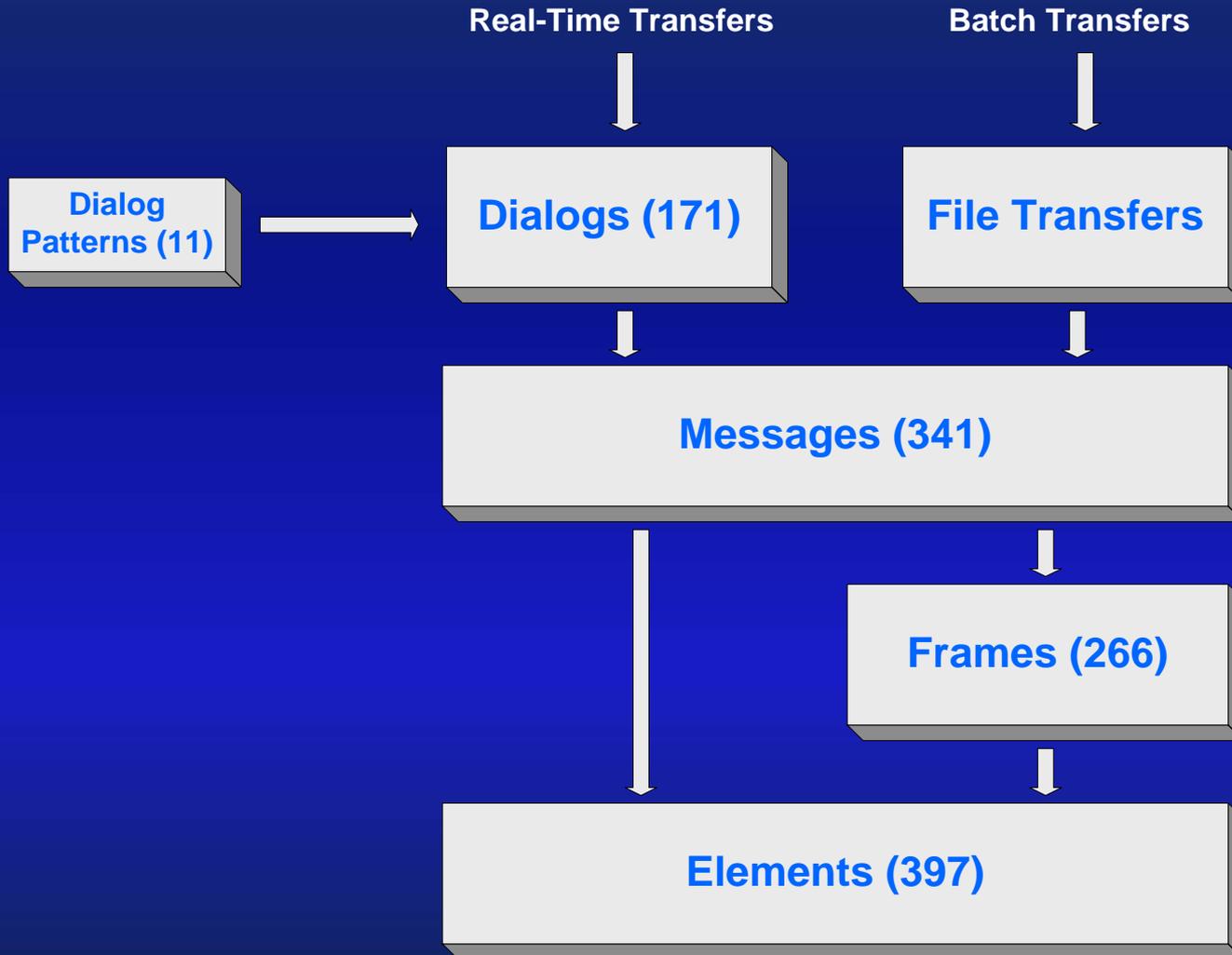
What Is TCIP?

- A set of standardized exchange protocols and data structures
 - Dialogs & File Transfers (exchange protocols)
 - Messages
 - Frames
 - Elements

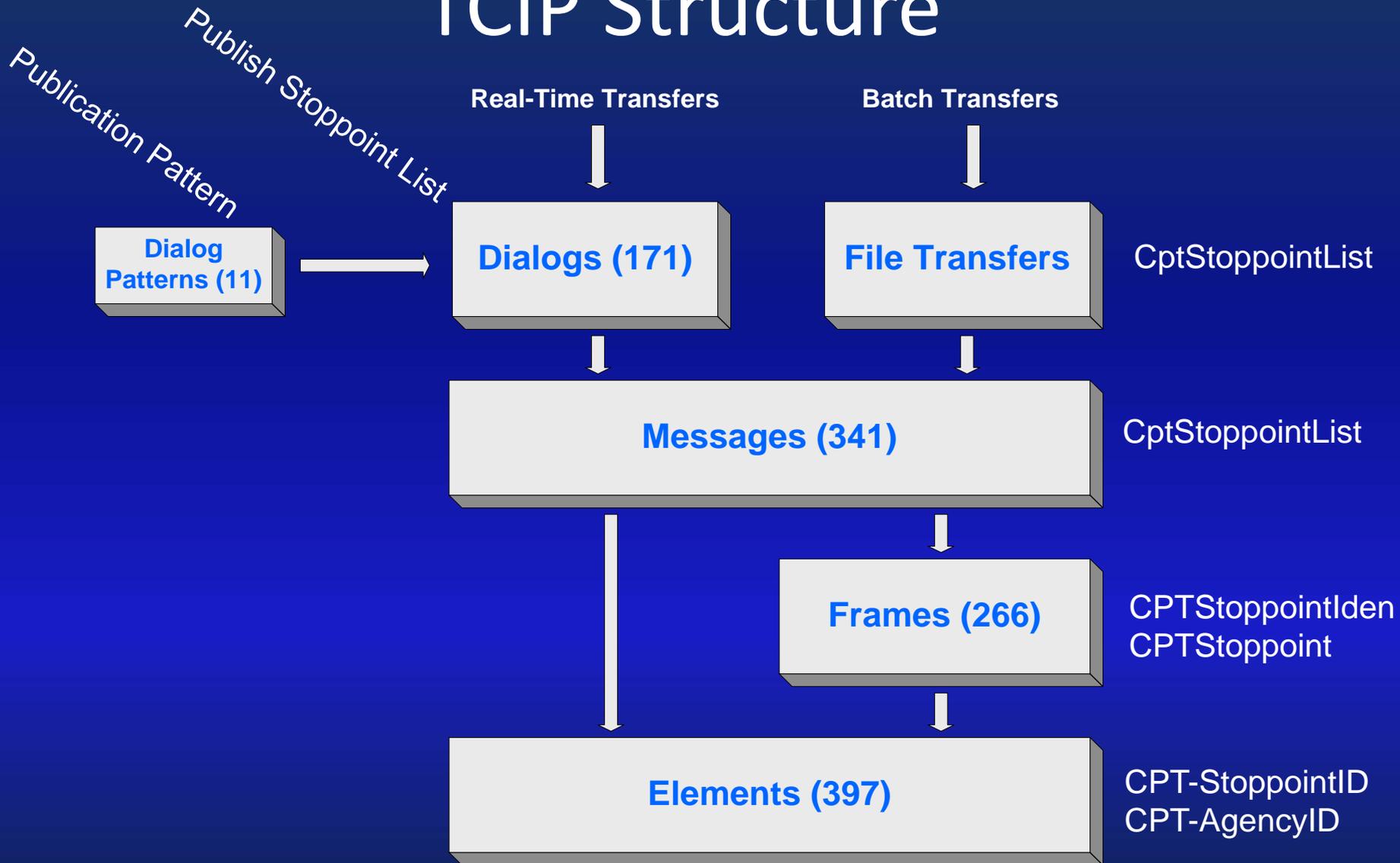
TCIP Coverage



TCIP Structure



TCIP Structure



TCIP Business Areas

- TCIP components are organized into 9 business areas:
 - Scheduling
 - Passenger Information
 - Incident Management
 - Onboard
 - Common Public Transportation
 - Control Center
 - Fare Collection
 - Spatial Data
 - Signal Priority

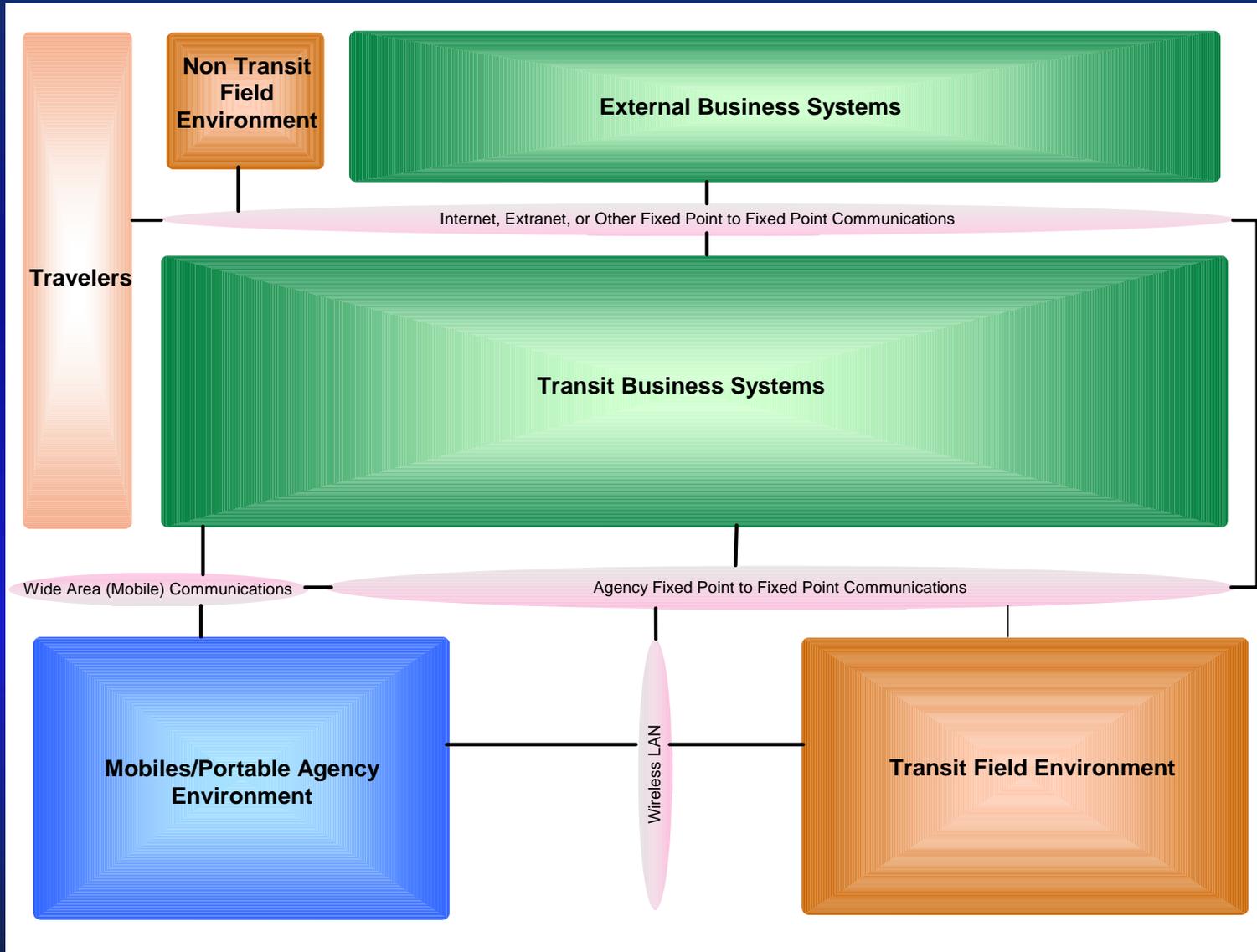
TCIP Standard

- Consists of a 4-volume set of documents
- Contains:
 - Model Architecture (non-normative)
 - Concept of Operations (non-normative)
 - Conformance Criteria
 - Dialog and File Transfer Definitions
 - Message Definitions
 - Frame Definitions
 - Element Definitions
 - XML Schema

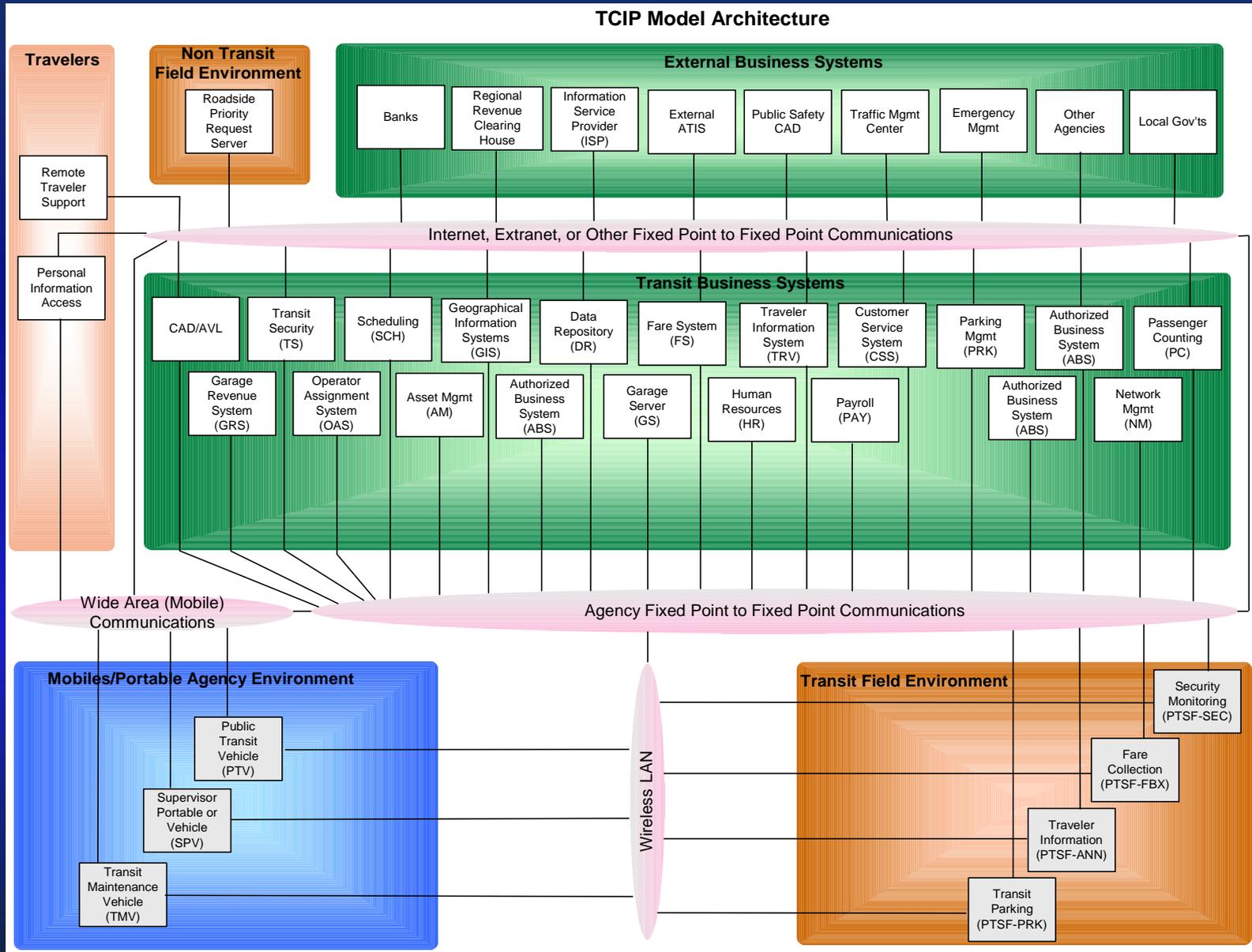
TCIP Model Architecture

- Based on National ITS Architecture
- Fully integrates Public Transport ITS into the overall surface transportation system ITS

TCIP Model Architecture



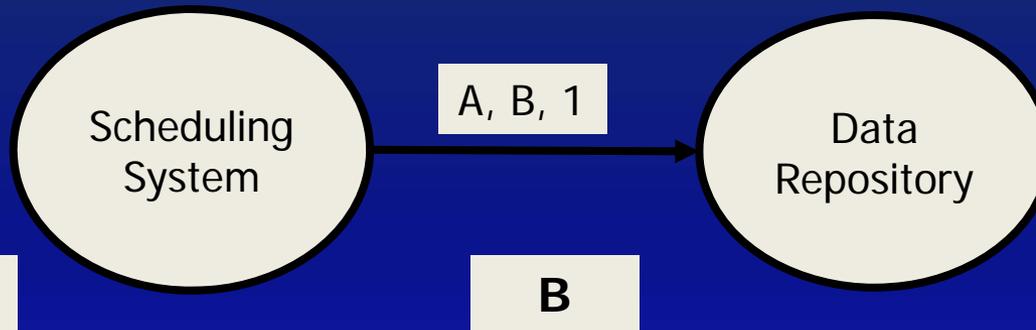
TCIP Model Architecture



TCIP Concept of Operations

- Provides descriptions of typical TCIP implementations
 - How one transit system component might interface with other system components
 - Typical information exchanges
 - Suggested dialog usage
- Concept of Operations is informative, not normative
 - Examples of use, not requirements

ConOps – Scheduling Info



A

- Publish Operator Assignments
- Publish Vehicle Assignments
- Publish Master Schedule Version
- Publish Block Schedule
- Publish Run Schedule
- Publish Route Schedule
- Publish Pattern List
- Publish Timepoint List
- Publish Running Times
- Publish Calendar
- Publish Roster

B

- Push Operator Assignments
- Push Vehicle Assignments
- Push Master Schedule Version
- Push Block Schedule
- Push Run Schedule
- Push Route Schedule
- Push Pattern List
- Push Timepoint List
- Push Running Times
- Push Calendar
- Push Roster

1

- SchPushOperatorAssignments
- SchPushVehicleAssignments
- SchPushMasterScheduleVersion
- SchPushBlockSchedule
- SchPushRunSchedule
- SchPushRouteSchedule
- SchPushPatternList
- SchPushTimepointList
- SchPushRunningTimes
- SchPushCalendar
- SchPushRoster

TCIP Integration With Other Standards

- TCIP shares data elements and data frames with other ITS standards, simplifying the integration of public transport ITS with the National ITS Infrastructure
 - Location Referencing Message Standard (LRMS) (SAE J-2266). Defines spatial concepts used by TCIP and other ITS standards such as Latitude, Longitude, Angle and Distance.
 - Objects Definitions for Signal Control and Prioritization (NTCIP 1211). Defines data structures and dialogs for requesting and obtaining Transit Signal Priority.
 - Common Incident Management Message Sets for Use by Emergency Management Centers (IEEE Std 1512-2000).
 - Message Sets for Advanced Traveler Information Systems (ATIS) (SAE J-2354). Defines multimodal traveler itinerary requests and responses.

Using TCIP

- TCIP was designed to cover a very wide range of potential transit applications & environments
 - From very small to very large operations
 - From relatively simple file-based systems to sophisticated database-centered operations
- TCIP is designed to be used ala carte – use only those sections of the standards that you need
 - Highly flexible, yet still an interoperability standard
- TCIP must be tailored to the specific interface(s) of interest prior to specifying & procuring a TCIP-compliant system

Tailoring TCIP

Define the Project/Product

Bus Arrival Server/Advanced Transit Authority

Tailoring TCIP

Define the Project/Product

Bus Arrival Server/Advanced Transit Authority

Select Interface Endpoints

AVL
Server

Arrival
Server

Bus Stop
Display

Tailoring TCIP

Define the Project/Product

Bus Arrival Server/Advanced Transit Authority

Select Interface Endpoints



A- Publish Fleet Locations
B- Publish Stoppoint ETAs

Select Dialog(s) and/or Transfers

Tailoring TCIP

Define the Project/Product

Bus Arrival Server/Advanced Transit Authority

Select Interface Endpoints



A- Publish Fleet Locations
B- Publish Stoppoint ETAs

Select Dialog(s) and/or Transfers

Select Optional Fields

Include Service Bulletins	Never
Include Destination	Always
Include Available Seats	Sometimes

Tailoring TCIP

Define the Project/Product

Bus Arrival Server/Advanced Transit Authority

Select Interface Endpoints



A- Publish Fleet Locations
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Include Service Bulletins	Never
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Publish Interface Specification

Profile
Requirements
List

Profile
Implementation
Conformance
Statement

TCIP Support Tools

TCIP Support Tool Suite

- TIRCE
- TCIP Message Builder
- TCIP Server
- TCIP Interrogator
- All TCIP tools are PC-based applications
 - XP, Vista, or Windows 7

TCIP Support Tool Suite

- Supports the development of TCIP-compliant interfaces from beginning to end
 - Interface definition (requirements)
 - Procurement (assessment of vendor responses)
 - Development (software development support)
 - Verification (against specified requirements)

TCIP Tool Suite

**Interface
Definition**



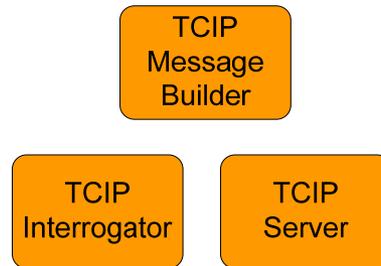
Requirements Definition
Interface Specification
TCIP Compliant Documentation

Procurement



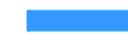
Automated Comparison
of Vendor Responses to
RFP Requirements

Development



Simulation Capability
TCIP Message Generation
Data Logging / Viewing

Verification



Automated TCIP
Compliance Verification

TCIP Implementations

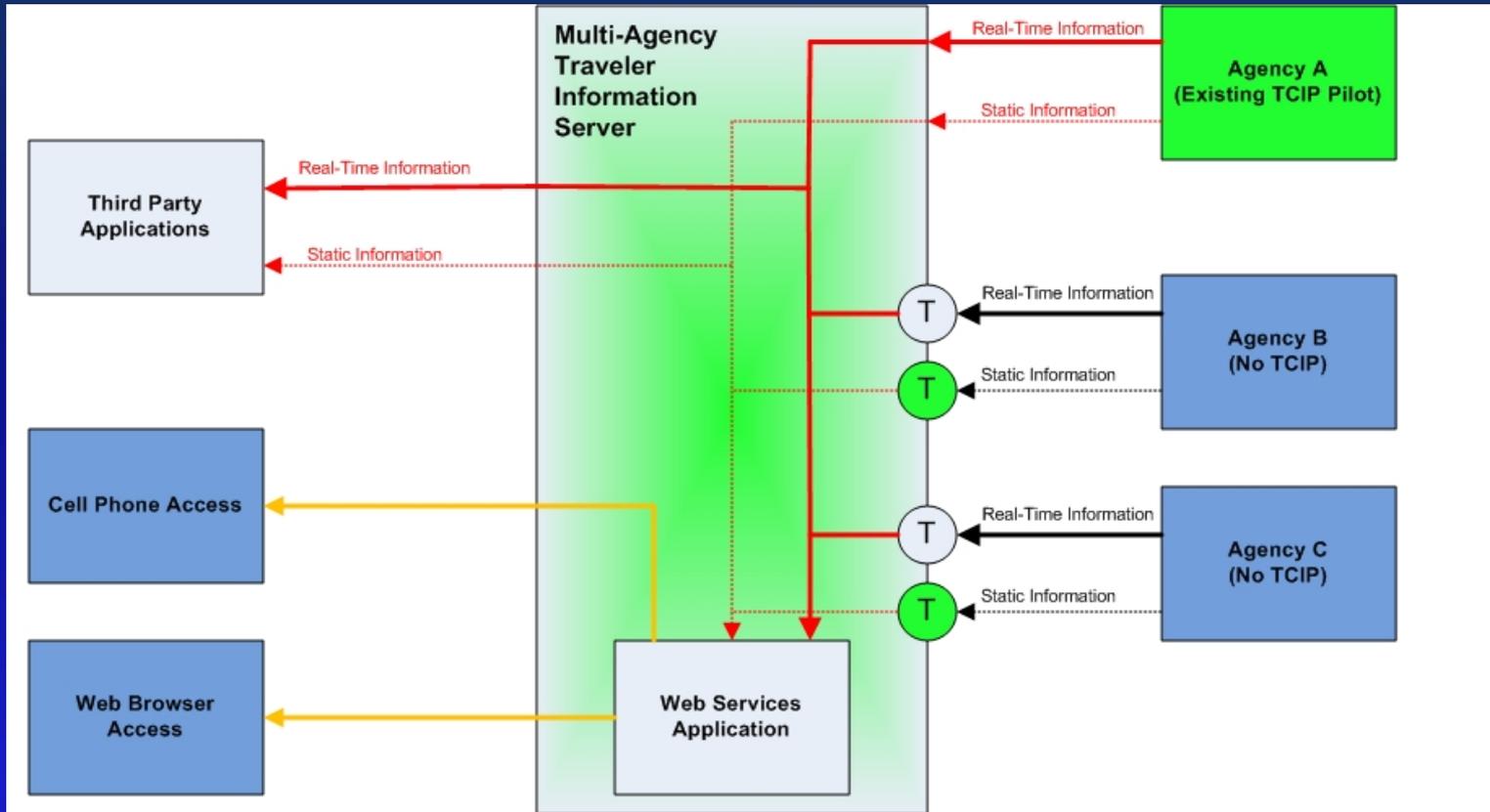
TCIP Pilots & Projects

- Seattle – MATIS, Signal Priority
- Orlando TCIP Traveler Information Pilot (aE)
- Chicago (Clever Devices)
- Dallas
- Houston
- Toronto (HDR / iTrans)
- Continental / Trapeze
- ACS
- Dynamic Timetable Generator (Systems & Solutions)

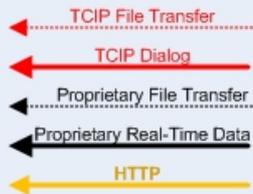
MATIS

- Multi-Agency Traveler Information Server
- Designed to provide a TCIP-standardized interface for 3rd party application developers to access transit data
 - Static information: scheduling
 - Dynamic information: fleet location

MATIS Concept



Line Legend



Fill/Shape Legend

Combination of New Development & Existing Software

New Software Development

Existing Software

Legacy Systems/Software

Translator

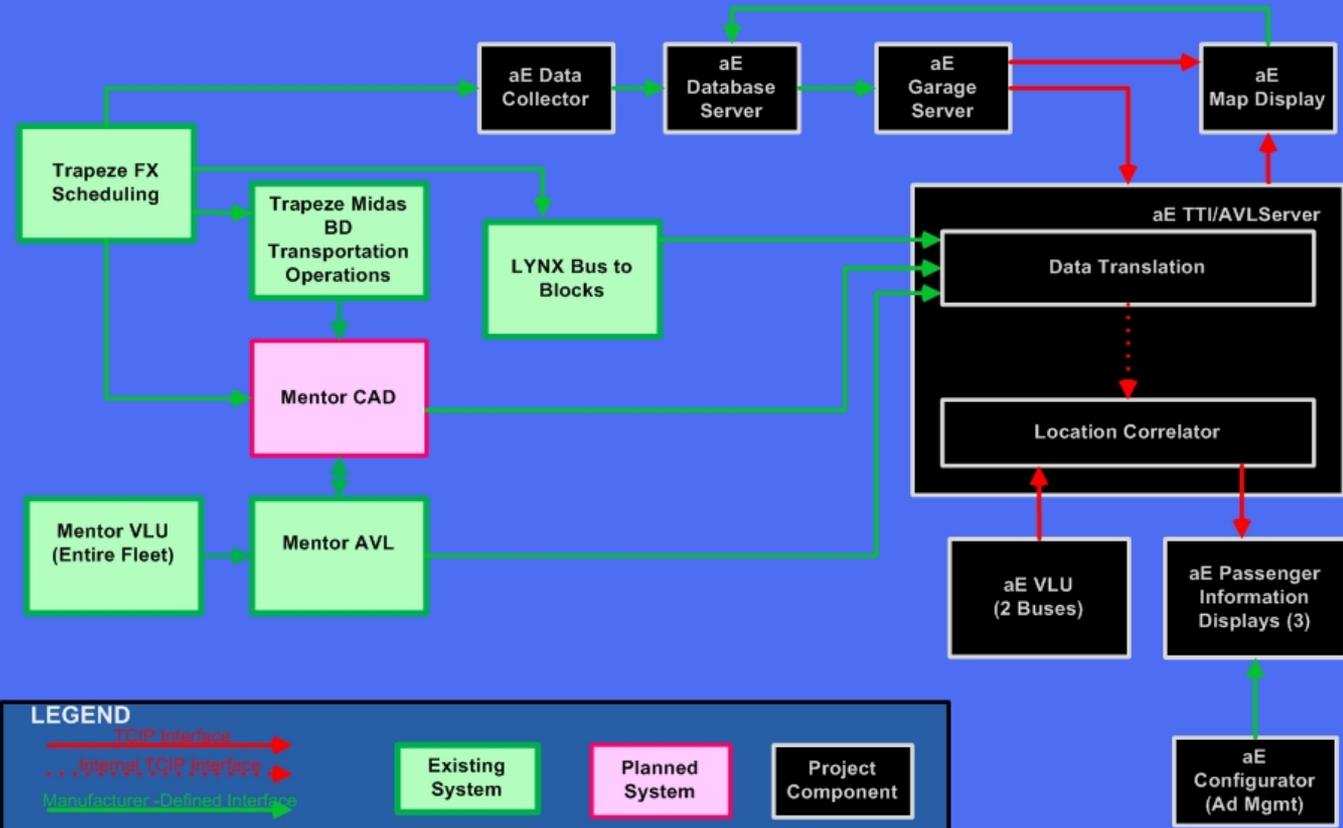


Orlando LYNX TCIP Traveler Information Pilot

- Imports Trapeze GIS & schedule data & converts to TCIP for use in file transfers.
- Imports vehicle assignments, & converts to TCIP for real-time use.
- Imports Mentor AVL data in real-time & converts to TCIP.
- Accepts native TCIP AVL from 2 test vehicles.
- Provides TCIP Passenger Information (bus location) in near-real-time.
- Provides TCIP map updates in near-real-time.

Orlando (LYNX)

LYNX TCIP Traveler Information Project



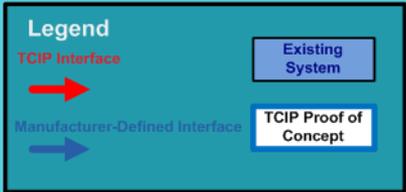
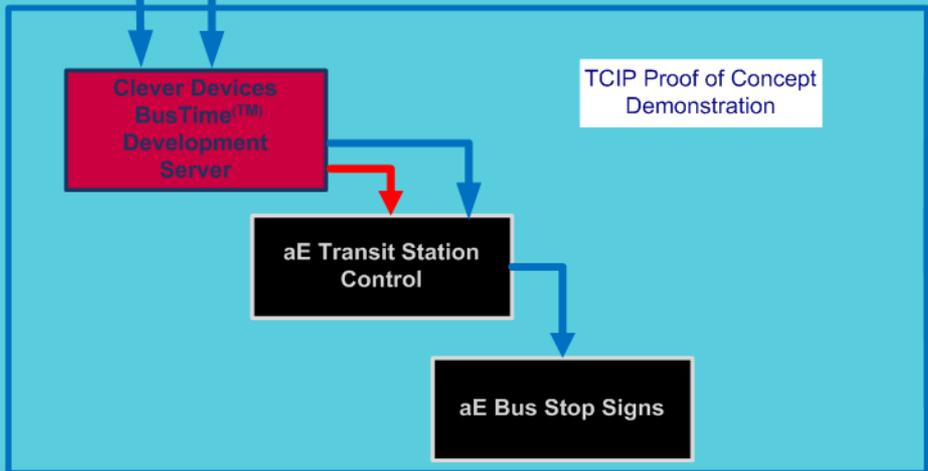
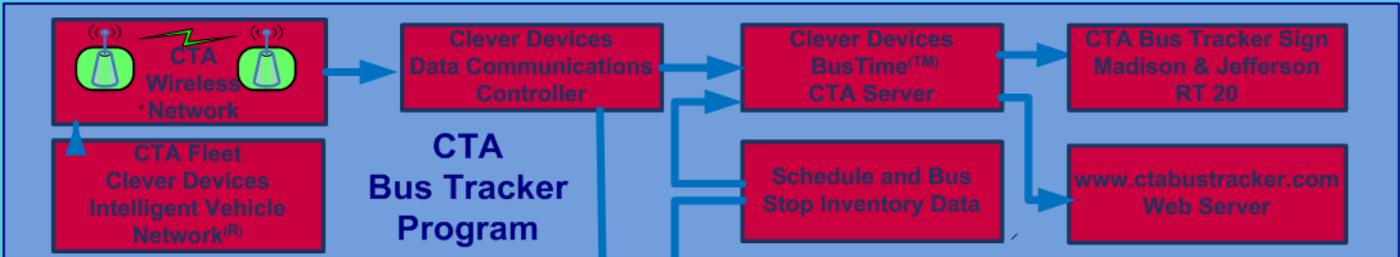
LEGEND

- TCIP Interface (Red arrow)
- Manufacturer-Defined Interface (Green arrow)
- Existing System (Green box)
- Planned System (Pink box)
- Project Component (Black box)



Clever Devices / CTA Pilot

Clever Devices TCIP Real-Time Traveler Information Proof-Of-Concept



Summary

- TCIP is the APTA (US) standard for transit data interfaces
- TCIP & support tools (including source code) are available free-of-charge to transit agencies, vendors and consultants
- Funded technical support is currently available thru APTA for early TCIP adopters (both agencies & vendors)