

TWG and Working Group Teleconference (July 15, 2002)**Schedule (all times are ET)**

Time	Business Area (WG chair)	Topics
11-12 pm	SP (Jim Davis)	harmonization issues and LRMS
12-1:30 pm	OB/CC (Bill Kronenberger)	change db items
1:30-2:30	PI (Mark Hickman & Gloria Stoppenhagen)	harmonization and ISO/Japanese requests
2:30-3:30	SCH & CPT (Julie Corman & Dan Overgaard)	Resolution of comments and revisit definitions
3:30-4:30 pm	general (lead: Isaac Takyi)	2 position papers

The Incident Management and Fare Collection Working Groups will meet later in the month.

Spatial Representation Working Group*Attending:*

Jim Davis (chair)

Mimi Hwang

Karen Watkins

Isaac Takyi

Jim Sims

Tom Kurihara

Jeff Gerfen

Polly Okunieff (consultant)

1. The WG went over the corrections made to the Changes database (071202) and the references related to clarifying the SpAddresspoint message. The new Changes database includes these corrections.
2. SpAddresspoint was redefined based on the new version of the USPS Publication 28 Addressing Standards and labels for each of the elements. The WG also added a provision for an exception string. Guidance should be defined within the message that the exception-string shall be used only for exception addresses as defined by the USPS Publication 28.

Reference to Changes (db) Index 32:

The revised message will be defined as follows:

```
SpAddresspoint ::= SEQUENCE {
    pre-directional    SP-CompassDirection...OPTIONAL,
    number            SP-RoadNumber,
    prefix            SP-RoadPrefix...OPTIONAL,
    name              SP-RoadName,
    type              SP-RoadType,
    suffix            SP-RoadSuffix OPTIONAL,
    post-directional  SP-CompassDirection OPTIONAL,
```

```

    exception-string    UTF8String (SIZE (1..30)) OPTIONAL,
    city                SP-CityName  OPTIONAL,
    community           SP-CommunityName  OPTIONAL,
    county              SP-County    OPTIONAL,
    province            SP-Province  OPTIONAL,
    state               SP-State     OPTIONAL,
    postalCode          SP-PostalCode,
    country             SP-Country   OPTIONAL
}
(WITH COMPONENTS {..., number PRESENT, name PRESENT, suffix
PRESENT} |
WITH COMPONENTS {..., exception-string PRESENT} )

```

The following data elements will no longer be used:

- SP-RoadPrefix
- SP-RoadType

SP-RoadSuffix will be updated to reflect Appendix C of the updated USPS Pub 28:Nov2000.

3. Harmonization issues were tabled until a side-by-side comparison of the TCIP SP data elements and LRMS data elements could be reviewed. This was a suggestion made in correspondence (7/11/02) between Jim Sims (TWG member) and Joel Markowitz (SAE LRMS/ ATIS chair).

4. Jeff Gerfen requested that direction may be needed to describe the dynamics of the direction in which a (transit) vehicle travels (e.g., degrees from north). This comment was referred to the CPT working group.

5. Jim Davis brought up the question of whether TCIP needs a “Grid” message and data elements. It was determined that most AVL location data is transformed to a grid coordinate system customized to the specific service area prior to transmission over the radio. The WG agreed that this was an important requirement to capture, however, the SP WG did not include AVL vendors, and so they recommend that the OB/CC group identify the requirements.

On-Board and Control Center (OB/CC) Working Group (12-1:30)*Attending:*

Bill Kronenberger (chair)
Karen Watkins
Isaac Takyi
Tom Kurihara
Polly Okunieff (consultant)

1. Topics reviewed included:

- IEEE transfer from TCIP format - completed by the end of this week
- By the end of July the new database will be in the new format
- GPS time is now the standard for time calculation (ANSI C time did not have a rollover method, GPS did)

2. Wheelchair Ridership information: Japan's position (handout was sent prior to working group meeting)- counting of wheelchairs along with abilities data. At issue is the creation of a new MID/PID at the SAE 1708 and 1939 committee meetings. Japan has requested that the door number MID associated with a wheelchair be qualified with an ability level; consensus was that Japan would have to define ability levels codes, not the USA; there is a related requested from Jim Kemp at NJT transit to add data to MID/PIDs for rail cars, specifically which half of a doorway patrons entered/alited. Task was given to Bill K to institute a request for new MID/PIDS as required, with the new PID for ability level to have 256 levels of locally defined metadata.

3. The WG reviewed the OB comments in the Changes database. The discussion involved the following:

3.1 Comment #109: levels of Conformance –level 3 for dialogs are not yet defined, Leave third level blank until standard for dialogs is approved.

3.2 Comment # 11: ObComponent – serial number is contained in J1587 message: ObBusComponentIdentificationParameters. Add “s” to parameters (in Appendix B). Reject comment, but correct typo in document.

3.3 Comment # 33: ObDoorRecord – change FcTransaction to FcFareTransaction as recommended. Approve comment.

3.4 Comment # 95: ObDoorRecord offset - Stop records contains door opens/closes; within the stop point area, doors open again. Recommendation requested that both events are associated with same bus stop, not two events. ObDoorRecord needs to be modified to include another field with an offset distance from original point. The association of more than one ObDoorRecord into the ObStopPointRecord would be performed by the VLU, based on knowledge of how to aggregate the ObDoorRecord messages so that they are associated with the relevant stop point. Approve comment.

3.5 Comment # 35: ObDoorRecord - ? include passenger load value or not - could be calculated after the doors are closed; original response indicated that if they wanted load information they could ask for it - the answer is that it is not a raw number, and should not be maintained with door records. (Reject proposed disposition). Reject comment.

3.6 Comment # 34: OB schedule adherence offset – correct spelling error

3.7 Comment # 12: ObSoftwareComponent - see disposition for #11 (page 26) (section 3.2 of these minutes)

3.8 Comment # 102: OB classification tree – correct typo

3.9 Comment # 105: OB video unit control status - pan/tilt/zoom/commands – Polly will review at NTCIP DMS standard for guidance. TCIP OB may defer to DMS standard. WG will need to ensure that SAE J1708/J1939 and NTCIP are compatible. Bill will talk to vendors about issues. (May wait until APTA Exhibition to discuss issues.) Comment Tabled.

3.10 Comment # 106 is duplicate of 95

3.11 Comment # 103: OB-ConfidenceMeasureShort – Leave as is but add examples that might provide guidance in the remarks section of the data element on how to define confidence measure. Comment Rejected with qualification.

3.12 Comment # 104: OB-HeadingDelta – change typos and wording for clarification. Comment Approved.

3.13 Comment # 107 Update PIDs and MIDs in Appendix A: Bill K will send Polly the information on 3M emitters PIDs.

4. The WG reviewed the CC comments (Section 1407). The discussion included the following:

4.1 Comment #37: CC-ReturnToleranceEarly – correct typo

4.2 Comment # 19: CC activate announcement from library, does it need an index into the annunciator library; optional for TCIP standard only, not 1708 standard. Approve comment, add index in TCIP as an optional field.

4.3 Comment # 36: CC activate schedule adherence - sequence up or down; error, Polly fixed. Approve comment.

4.4 Comment # 18: CC data template - similar to outbound message template; retire one or add field to data load template; make data load obsolete. Approve to make CcDataLoadTemplate obsolete.

4.5 Comment # 38: CC operator assignment – correct type reference to be consistent.

4.6 Comment # 39: CC route adherence entry - response just describes the threshold, route number is embedded in report. Generate a data element or message that includes information on type of alarm (off schedule, off route)

4.7 The WG missed one last Comment, # 101, however the comment deals with a message that was made obsolete.

Passenger Information Working Group (1:30-2:30)*Attending:*

Mark Hickman (co-chair)
Gloria Stoppenhagen (co-chair)
Gerry Tumbali
Karen Watkins
Isaac Takyi
Tom Kurihara
Polly Okunieff (consultant)

1. The first topic discussed harmonization issues related to PI-SignType. The WG reviewed the NTCIP data element and found it did not meet transit requirements. However, in an email discussion among WG members, Ms. Wilson pointed the WG to an updated version of the data element. See Appendix A for the text of the discussion. **This issue is still open.**

2. A hand-out, “Requirements for Passenger Information” was submitted to the PI WG by the US delegation to TC 204 WG 8 on Public Transport and Emergency. These are requests submitted by the Japanese delegation to the WG. (See Appendix B).

The following were agreed to with respect to the three proposals.

- Create a message called PiDepartTimeAtLastStop (Gerry stated that RTA is including this information in their regional customer information system)
- Don’t necessarily create a new message called PiScheduleAdherence (see slide #7), but do add a tolerance on the status information (+ or – time units) in a CHOICE structure in the PiDynamicSignMessage.
- Change PiParkingFacility to the recommended changes, however, don’t create a new data element called PI-VehicleClass. Instead use PI-ParkingVehicleClass and add to the definition.
- Add and reassign types to the PI-ParkingVehicleClass as follows:
 - all (1), compact (2), standard (3), van (4), oversized (5), truck (6), bus (7)

3. # 28: PiNearestStop: assign status “closed”

4. # 88: PI-ParkingType: Add to disposition comment: codes are not mutually exclusive, define “open lot” as uncovered (similar to “surface lot”)

5. # 91: PiTripLeg: Add to disposition comment: “as optional with at least one of them mandatory.”

Scheduling/Runcutting Working Group (2:30-3:30)*Attending:*

Julie Corman (co-chair)
Dan Overgaard (co-chair)
Jim Davis
Jerry Tumbali
Mimi Hwang
Jerry Lutin
Jeff Gerfen
Audrey White
Karen Watkins
Isaac Takyi
Tom Kurihara
Polly Okunieff (consultant)

1. The chairs want to revisit the definitions for SCH data elements. They submitted comments later for distribution (see Appendix C). **These issues/changes are still open. The committee will solicit comments on the changes over the next two weeks (end of July).**
2. Jeff brought up issue of what to use for a customer oriented schedule that includes all the routes. Polly referred him to PiPublishedSchedule. The WG decided that the document needs guidance on how to interpret the PiPublishedSchedule. Further, the message is only per route, not all the routes. An action was decided to create a *package* for grouping parts of the Master Schedule (SchMasterSchedule) of a time table version together. The SchMasterSchedulePackage should be capable of grouping by mode, base, blocks, runs, set of routes, or the entire system.
3. Item # 85: SchTrip (SEQUENCE OF SCH-TripType) – affirm that there is only one SCH-TripType, take out SEQUENCE OF.
4. Jeff identified the need to include direction of travel of a transit vehicle along a route at a bus stop and/or time point. There was discussion on whether this kind of information is already in the Route message as an ordered sequence of bus stops and time points. This question will be taken off-line in a discussion between Jeff and Dan Overgaard.

Technical Working Group (3:30-4:30)*Attending:*

Isaac Takyi (chair)

Julie Corman

Dan Overgaard

Jim Davis

Mimi Hwang

Jerry Lutin

Jeff Gerfen

Audrey White

Karen Watkins

Tom Kurihara

Jerry Tumbali

Polly Okunieff (consultant)

The two white papers distributed prior to the meeting (see Appendices D and E) were discussed.

1. The Working Group decided to accept the recommendation described in the White Paper discussing Enumerated versus Integer (Appendix D), that is, to encourage the use of enumerated for types defined by other authorities and standards, and to continue to use integer representations for types that are defined by transit agencies.
2. The recommendation in the 2nd white paper on Error Codes (Appendix E) was generally acceptable to WG members. The group wanted to receive comments from APTA's contractor developing the Simulation before it agreed to third recommendation. Okunieff will solicit comments from Critical Link on the White Paper. **This issue is still open.**
3. Karen Watkins discussed some of the issues related to updating the document with respect to the National ITS Architecture. She provided a file with comments and recommended changes to the TCIP Maintenance consultant. She recommended that the Framework document include the architecture flows to the latest version (version 4) of the National ITS Architecture. She also recommended that we define "event" and "incident" in the Glossary since transit uses those terms differently than Emergency Management and Traffic Management communities. Her comments were well received.

Appendix A: PI-SignType Harmonization Discussion

-----Original Message-----

From: Mark Hickman [mailto:mhickman@enr.arizona.edu]
Sent: Tuesday, July 16, 2002 4:12 PM
To: Watkins, Karen; 'Okunieff, Paula1'; Wilson, Charnita (N-M&M)
Cc: 'Stoppenhagen, Gloria 1'
Subject: Re: TCIP Harmonization Issues

Thanks for the clarification - that's great.
Mark

----- Original Message -----

From: [Watkins, Karen](#)
To: '[Mark Hickman](#)'; '[Okunieff, Paula1](#)'; [Wilson, Charnita \(N-M&M\)](#)
Cc: '[Stoppenhagen, Gloria 1](#)'
Sent: Tuesday, July 16, 2002 1:10 PM
Subject: RE: TCIP Harmonization Issues

Mark,

I agree that they should be optional in the TCIP message. All I meant was that the other codes in the DMS_DmsSignType message had to do with the type of sign, not the content of the message that goes on the sign. Sorry -- I misunderstood what they meant.

Karen Watkins

Lockheed Martin
Manassas, Va., 20110
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-----Original Message-----

From: Mark Hickman [mailto:mhickman@enr.arizona.edu]
Sent: Tuesday, July 16, 2002 3:51 PM
To: Watkins, Karen; 'Okunieff, Paula1'; Wilson, Charnita (N-M&M)
Cc: 'Stoppenhagen, Gloria 1'
Subject: Re: TCIP Harmonization Issues

Hi Karen,

If the NTCIP is willing to change their DMS_DmsSignType to include the static sign, I think this would be okay. I wasn't sure, though, what you meant by, "[The rest of the DMS_DmsSignType is not what goes into the message.](#)" To me it would seem advantageous to have the other DMS codes from the DMS_DmsSignType at least optional in the TCIP message.

Regards, Mark Hickman

----- Original Message -----

From: [Watkins, Karen](#)
To: '[Okunieff, Paula1](#)'; [Wilson, Charnita \(N-M&M\)](#)
Cc: '[Hickman, Mark 1](#)'; '[Stoppenhagen, Gloria 1](#)'
Sent: Tuesday, July 16, 2002 12:41 PM
Subject: RE: TCIP Harmonization Issues

OK. Ignore my previous email. Charnita straightened this out a little. What was in the "Current Harmonization" report was what exists in the standard today for DMS. Her attached message states that they have agreed to add "Static" to the list of DMS_DmsSignType's. That should take care of transit's need and harmonize with PI_SignType. The rest of the DMS_DmsSignType is not what goes into the message. So maybe TCIP will be OK with this?

Thanks.

Karen Watkins

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-----Original Message-----

From: Watkins, Karen
Sent: Tuesday, July 16, 2002 3:21 PM
To: 'Hickman, Mark 1'; 'Stoppenhagen, Gloria 1'
Subject: RE: TCIP Harmonization Issues

Mark/Gloria,

I had old email addresses for you. Hope this works a little better and you receive the note.

Thanks.

Karen Watkins

Lockheed Martin
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karen.watkins@lmco.com
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-----Original Message-----

From: Watkins, Karen
Sent: Tuesday, July 16, 2002 3:14 PM
To: Wilson, Charnita (N-M&M)
Cc: 'Okunieff, Paula1'; 'Takyi, Isaac'; 'Hickman, Mark'; 'Stoppenhagen, Gloria'
Subject: RE: TCIP Harmonization Issues

Charnita,

In looking at the "Current Harmonization" DB that you sent before the June meeting, #3342 and #10546 dealt with sign type. The first was about harmonizing DMS_DmsSignType with PI_SignType, the second about harmonizing PI_SignType with DMS_DmsSignType (this one was deleted).

In discussing this at yesterday's meeting, (1) we did not understand the meaning of the "bos" type, and (2) someone (Isaac?) looked up the DMS message, and found that "other" meant "blank sign". The DMS sign type is clearly for dynamic signs. Transit has a need for both dynamic and static signs (a sign that does not change). That was the purpose of PI_SignType, to distinguish between them, not to hold the messages for display on a dynamic message sign. TCIP folks, do you agree? Does TCIP still prefer to keep its own PI_SignType and not harmonize with DMS_DmsSignType? There are other TCIP-PI data elements and messages that hold the messages for a transit dynamic message sign (and a different message for a static sign).

Thanks.

Karen Watkins

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-----Original Message-----

From: Wilson, Charnita (N-M&M)

Sent: Tuesday, July 16, 2002 2:53 PM

To: Watkins, Karen

Cc: 'Okunieff, Paula1'; 'Takyi, Isaac'

Subject: RE: TCIP Harmonization Issues

The suggestion was to use the NTCIP new device object "Sign_Type_code".

Name: SIGN_Type_code

Def'n: Indicates the type of sign, e.g., static, blank-out, changeable, variable, etc.

Values:

1 = other,
 2 = bos,
 3 = cms,
 4 = vmsChar,
 5 = vmsLine,
 6 = vmsFull,
 17 = static (not dynamic),
 129 = portableOther,
 130 = portableBOS,
 131 = portableCMS,
 132 = portableVMSChar,
 133 = portableVMSLine,
 134 = portableVMSFull,
 255 = unknown

The main reason was because if the transit community is using a type of DMS sign they should consider using NTCIP only because DMS is currently one of the most deployed standards. As for the LRMS and SP data elements, the only data elements that need to be harmonized are the ones identified in the "Current Harmonization Reports" handed out during the meeting. This was Harmonization Set #17. So, please don't think that all of the SP data elements will be replaced by LRMS.

Regards,
 Charnita

-----Original Message-----

From: Watkins, Karen

Sent: Tuesday, July 16, 2002 2:10 PM

To: Wilson, Charnita (N-M&M)

Cc: 'Okunieff, Paula1'; 'Takyi, Isaac'

Subject: TCIP Harmonization Issues

Charnita,

In addition to the LRMS and TCIP-SP issues, the following one came up yesterday:

PISignType - NTCIP has DMS_DMSSignType. PI cannot adopt this from NTCIP. From DMS_SignType, "Other" = a blank sign. This is NOT a static sign (what transit needs). In PI, SignType was mainly needed to distinguish between dynamic and not dynamic signs. TCIP can't use the NTCIP DMS sign type; must keep its own - needs active and static bus stop signs. Does NTCIP have msg for a static sign? They are not interested in customer info, which transit needs.

Hope this makes sense. Thanks.

[Charnita -- Did John Hassan get back with you and Trevor? I left him a message, too.]

Karen Watkins

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Appendix B: ISO TC 204 WG 8 Requests for Changes

Requirements for Passenger Information

Japan Comment 4

Japan Comment 5

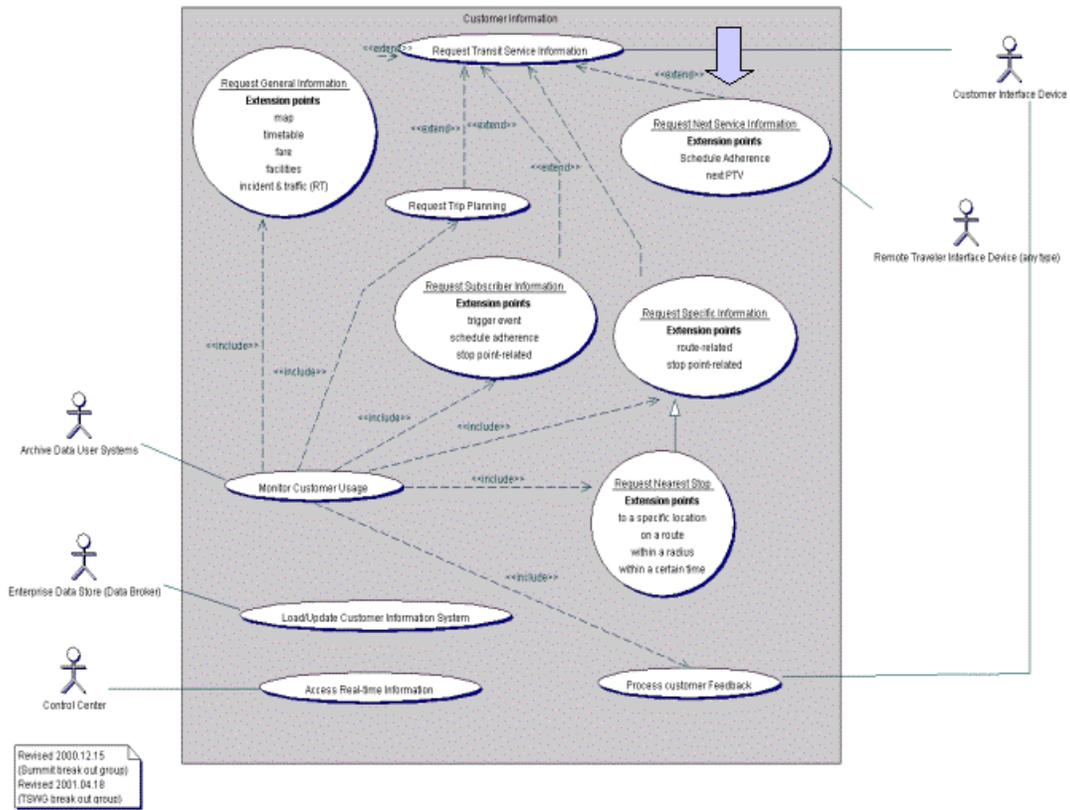
Japan Comment 6

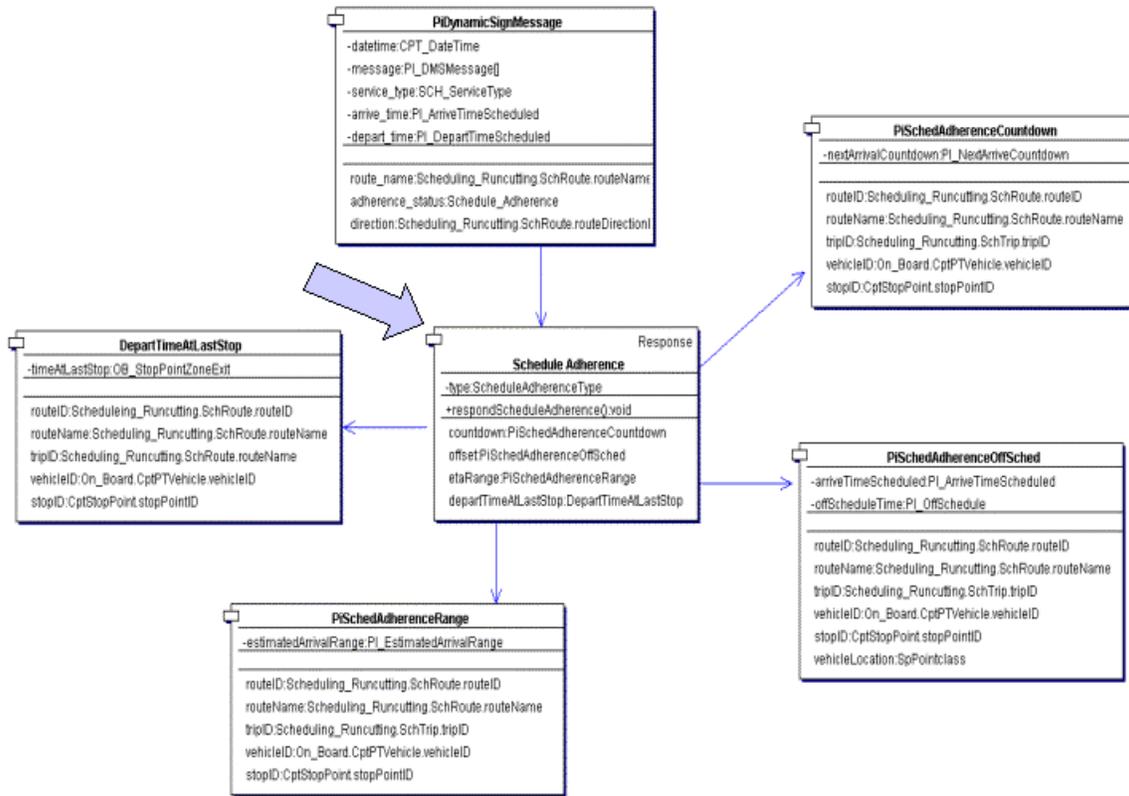
Requirements to Support

- Japan Comment 4
 - Use of cellular phone and other media to request schedule adherence
- Japan Comment 5
 - Provision of real-time schedule adherence in absence of request
- Japan Comment 6
 - Provision to provide schedule adherence updates on service status at stops

Traveler Interface Devices

- Traveler Interface Devices include:
 - Cellular phone/pager/PDA
 - Internet (ISP)
 - Automated Telephone (voice response)
 - Verbal request (telephone)
- Remote Traveler Interface Device
 - Subset of Customer Interface Device (including Cellular phone/pager/PDA, Automated Telephone)
 - Kiosk (ISP)
 - Dynamic Message Sign





Current PiDyanmicSignMessage

```
PiDynamicSignMessage ::= SEQUENCE {  
  datetime      CPT-DateTime OPTIONAL,  
  route-name    SCH-RouteName  OPTIONAL,  
  service-type  SCH-ServiceType OPTIONAL,  
  direction     SCH-RouteDirectionName  OPTIONAL,  
  arrive-time   PI-ArriveTimeScheduled  OPTIONAL,  
  depart-time   PI-DepartTimeScheduled  OPTIONAL,  
  adh-range     PiSchedAdherenceRange  OPTIONAL,  
  adh-countdown PiSchedAdherenceCountdown  OPTIONAL,  
  adh-offsched  PiSchedAdherenceOffSched  OPTIONAL,  
  message       SEQUENCE OF PI-DMSMessage  OPTIONAL  
}
```

PI-DMSMessage: "A free text data element used for sending text messages for display to dynamic message signs."

Current PiDyanmicSignMessage

```

PiDynamicSignMessage ::= SEQUENCE {
datetime      CPT-DateTime OPTIONAL,
route-name    SCH-RouteName   OPTIONAL,
service-type  SCH-ServiceType OPTIONAL,
direction     SCH-RouteDirectionName OPTIONAL,
arrive-time   PI-ArriveTimeScheduled OPTIONAL,
depart-time   PI-DepartTimeScheduled OPTIONAL,
adh-range     PiSchedAdherenceRange OPTIONAL,
adh-countdown PiSchedAdherenceCountdown OPTIONAL,
adh-offsched  PiSchedAdherenceOffSched OPTIONAL,
message       SEQUENCE OF PI-DMSMessage OPTIONAL
}

```

PI-DMSMessage: "A free text data element used for sending text messages for display to dynamic message signs."

PiParking Facility by Vehicle Class

Japan Comment 8

PiParkingFacility Definition

```
PiParkingFacility ::= SEQUENCE {
    parkingFacID PI-ParkingFacID,
    stopID CPT-StopPointID,
    entrances SEQUENCE OF PI-ParkingEntranceID
OPTIONAL,
    owner PI-ParkingOwnerName OPTIONAL,
    phone PI-ParkingFacPhone OPTIONAL,
    type PI-ParkingType OPTIONAL,
    spacesTotal PI-ParkingSpacesTotal OPTIONAL,
    spacesAvailable PI-ParkingAvailibility
OPTIONAL,
    modes SEQUENCE OF CPT-Mode OPTIONAL,
    rates PI-ParkingRates OPTIONAL,
    operatingHours PI-ParkingHoursofOperation
OPTIONAL,
    fillTime PI-ParkingFillTime OPTIONAL,
    footnote PI-Footer OPTIONAL
}
```

Add Vehicle Class

- Group availability by vehicle Class (changed order and added objects)

```

...
modes SEQUENCE OF CPT-Mode OPTIONAL,
spacesTotal PI-ParkingSpacesTotal
    OPTIONAL,
parkingProvided SEQUENCE OF {
    vehicleClass PI-VehicleClass
    spacesAvailable PI-ParkingAvailibility
        OPTIONAL,
    rates PI-ParkingRates OPTIONAL,
    operatingHours PI-ParkingHoursofOperation
        OPTIONAL,
    fillTime PI-ParkingFillTime OPTIONAL,
    footnote PI-Footnote OPTIONAL } OPTIONAL
}

```

PI-VehicleClass Definition

- PI-VehicleClass

```

PI-VehicleClass ::= INTEGER
{ all(1),
  compact(2),
  standard(3),
  van(4),
  truck(5)
  -- 6-255 } (0..255)

```

Appendix C: Notes on Scheduling/Runcutting

From: Julie Corman
To: Polly Okunieff

<<tcipdescriptions2.doc>> Polly, Dan and I actually modified the definitions of most of the data elements and messages. At the end of the table you'll find a repeat of these issues that cropped up as we did this work. Also, there is a context piece at the end of this document that could be inserted into Section 3 between inputs and outputs to give the end-user the context for these elements. If this looks like an approach you'd like to take, could you circulate it amongst the other subgroup participants? Thanks. -Julie

Definition Issues:

- Many of the data elements that refer to vehicle assignments, contain the name "block", while the message for vehicle assignment uses "VehicleAssignment". We recommend that TCIP use one or the other (preferably vehicle assignment) and refer to the alias "block" in the SchVehicleAssignment definition
- In these revised definitions, we tried to adopt a standardized definition style. For example, all ID data elements started with the phrase: "A unique number assigned to..." followed by the name of the element, rather than the definition of the element, that it was assigned to. All designators started with the phrase: "A unique alpha-numeric designator of..." We recommend that the Group consider adopting style standards for the definitions. Another style issue is whether vehicle should be PT vehicle in the definitions.
- It wasn't clear to us whether the **TypeDescription data elements were the descriptions assigned to all of the 255 types, to just the local use types or what...
- Many of the data elements have an ID, a name and a designator. We remember that we discussed the distinction when we first developed the data elements, but are not sure we still understand the distinction. Do we need all three? Is there some consistent relationship, hierarchy or distinction between the three elements that we could include in the definition to help the end user?
- The message "SchRoute" has both SCH-RouteDesignator and SCH-RouteID as required elements. Shouldn't it be a choice of?

ANSI Name	Definition
SCH_ActivationID	A unique number assigned to an activation event
SCH_ActivationTypeDescription	The description of a (local use?) type of activation.
SCH_AnnouncementID	A unique number assigned to an announcement within a transit agency
SCH_AnnouncementLocationID	A unique number assigned to an announcement location
SCH_BlockDesignator	A unique alpha-numeric designator of a vehicle assignment
SCH_BlockGroupName	The name given to a grouping of vehicle assignments
SCH_BlockID	A unique number assigned to a vehicle assignment

SCH_BlockName	The name given to a vehicle assignment. For legacy systems, the block name often identifies the major route served by the block and the pull out sequence.
SCH_DayTypeDescription	The description of a (local use?) type of day that affects transit service
SCH_OperatorDesignator	A unique alpha-numeric designator of a PT vehicle operator
***SCH_PassengerMile - add	<i>Need to add element, use same language as for PassengerKilometers, only change kilometers to miles</i>
SCH_PatternDesignator	A unique alpha-numeric designator of a pattern
SCH_PatternID	A unique number assigned to a pattern
SCH_PatternName	The name given to a pattern
SCH_PayType	The pay factor that identifies the amount of money paid for specific types of duty
SCH_PullinTime	The time at which a transit vehicle arrives at its storage facility (vehicle base) at the end of a vehicle assignment
SCH_PulloutTime	The time at which a vehicle pulls out of its storage facility (vehicle base) at the start of a vehicle assignment
SCH_RosterDesignator	A unique alpha-numeric designator of a roster
SCH_RosterID	A unique number assigned to a roster
SCH_RouteDesignator	A unique alpha-numeric designator of a route
SCH_RouteDirectionID	A unique number assigned to the direction of a route
SCH_RouteID	A unique number assigned to a route
SCH_RouteName	The name given to a route
SCH-RunDesignator	A unique alpha-numeric designator of a run
SCH-RunID	A unique number assigned to a run
SCH-RunningSpeed	The average speed maintained between two points
SCH-RunningTimeActual	The actual time for a transit vehicle to travel between two points
*SCH-RunningTimePeriodName	The name given to a running time period
SCH-RunningTimeSched	A time assigned to the movement of a PT vehicle between time points
SCH-StopPointLength	The linear length along a curb or parking area at a stop point
SCH-StopPointSequenceNo	A unique number assigned to a sequence of bus stops served by a pattern or route
SCH-TimeBegin	The beginning time for a time period
SCH-TimeEnd	The ending time for a time period
SCH-TimePointDesignator	A unique alpha-numeric designator of a timepoint
SCH-TimePointID	A unique number assigned to a timepoint
SCH-TimePointIntervalDesignator	A unique alpha-numeric designator of a timepoint interval
SCH-TimePointIntervalID	A unique number assigned to a timepoint interval
SCH-TimeTableVersionID	A unique number assigned to a timetable version
SCH-TimeTableVersionName	The name of a timetable version. E.g. "Summer"
SCH-TripDesignator	A unique alpha-numeric designator of a trip

SCH-TripID	A unique number assigned to a trip
SCH-TripTimePointDescription	The description of a (local use?) trip time point
SCH-TripTimePtAttribute	An attribute of a timepoint in the context of a trip
**SCH-TripTimePtTime	<u>Delete this element</u>
SCH-TripType	A classification of a trip, whether revenue or non-revenue
SchActivateDriver	This message indicates the requirements for activating a driver message
SchBlockGroup	A grouping of vehicle assignments, for example, on common characteristics such as use of a common corridor, terminus or route direction name.
SchMasterSchedule	A table that includes all the time points and trips on a route. Contained within the SchRoute is the Master Schedule Header information. Contained within SchTrip is the day type information
SchMasterScheduleHdr	Sequence of time point identifiers and/or their names used to define the order of time points for all the patterns. This field may be used to build timetables, for exterior signs, etc.
SchPattern	A sequence of points and events that define a route segment
SchPieceOfWork	A piece of an operator's assignment
SchRoute	A collection of patterns in revenue service, with a common route identifier
SchRun	A transit operator's daily assignment
SchRunningTimePeriod	The division of an operating day into time periods for the purpose of assigning running times
SchTimePoint	A point along a route where trips are assigned arrival or departure times
SchTimePointInterval	The one-way path of travel between two consecutive timepoints on a block
SchTrip	A one way scheduled movement of a transit vehicle between two terminals

*Replaces SCH-RunningTimePeriod

**This element is deleted

***SCH-PassengerMile should be added

Definition Issues:

- Many of the data elements that refer to vehicle assignments, contain the name "block", while the message for vehicle assignment uses "VehicleAssignment". We recommend that TCIP use one or the other (preferably vehicle assignment) and refer to the alias "block" in the SchVehicleAssignment definition
- In these revised definitions, we tried to adopt a standardized definition style. For example, all ID data elements started with the phrase: "A unique number assigned to..." followed by the name of the element, rather than the definition of the element, that it was assigned to. All designators started with the phrase: "A unique alphanumeric designator of..." We recommend that the Group consider adopting style

standards for the definitions. Another style issue is whether vehicle should be PT vehicle in the definitions.

- It wasn't clear to us whether the **TypeDescription data elements were the descriptions assigned to all of the 255 types, to just the local use types or what...
- Many of the data elements have an ID, a name and a designator. We remember that we discussed the distinction when we first developed the data elements, but are not sure we still understand the distinction. Do we need all three? Is there some consistent relationship, hierarchy or distinction between the three elements that we could include in the definition to help the end user?
- The message "SchRoute" has both SCH-RouteDesignator and SCH-RouteID as required elements. Shouldn't it be a choice of?

Scheduling Context for TCIP 1404

Note: This discussion probably fits in Section 3, Basic Concepts, between 3.2.1 Inputs and 3.2.2 Outputs. In other words, an agency uses the described Inputs to perform Scheduling Processes, which then provide the described Outputs.

3.x Scheduling Processes

The scheduling component of transit includes three key processes to define and manage transit service: schedule writing, block building and run-cutting.

3.x.x Schedule Writing

Schedule writing is the process of creating a route and defining the service that will operate that route. A route is defined by one or more patterns – the geographic paths over which trips travel. Patterns may contain many types of points and events, including timepoints, bus stops, transfer points, fare zone changes, destination sign changes, transit signal priority triggers, operator road relief points, automated announcements to passengers and other messages to the operator.

Timepoints are exact locations along routes where trips are assigned specific arrival and departure times. Running time is defined between any two consecutive timepoints, called a timepoint interval, and may be used as a system-wide default for all routes traveling between the pair. Some agencies maintain a separate running time table for each route, in order to more accurately reflect the different operating conditions affecting various routes. Trips are built from the time at a particular timepoint in a particular pattern using either the system or route level default running times between the remaining timepoint pairs in the pattern.

3.x.x. Block Building

Once schedules are written, the block building process combines a series of consecutive trips into vehicle assignments in order to minimize the number of coaches and platform hours. A block, also known as a vehicle assignment, includes everything a coach is assigned to do from the time it

pulls out of the vehicle base until it pulls in. Different vehicle types are assigned to specific trips or routes based on ridership requirements or other characteristics of the route. The block building process determines the amount of layover or recovery time that a coach will have between scheduled revenue trips. This is also the process that identifies the deadhead trips that might be needed to move a coach from last terminal of one route to the first terminal of another so that all trips are operated efficiently.

3.x.x. Run-Cutting

Run-cutting is the final step in the scheduling process, in which vehicle assignments are cut into operator assignments. A short vehicle assignment may require just one operator, while longer vehicle assignments may require several operators throughout the day. Some pieces of work may be combined to create a split shift assignment for a guaranteed 8-hour day. The goal of the run-cutting process is to efficiently distribute the work so that overall costs are minimized given union contract rules, pay rates, work rules and management requirements.

3.x.x. Going Into Production

When these three scheduling processes are complete, the scheduling data are transmitted or published to the rest of the transit agency for implementation, as summarized in Section 3.x.x. Outputs.

Appendix D: White Paper: Code List Description: Integer versus Enumerated Types

Definition

“3.8.24 enumerated types: Simple types whose values are given distinct identifiers as part of the type notation.”

1. Problem Statement/Issue

Most other functional data dictionaries define their code lists as “enumerated types”. This White Paper proposes that TCIP TWG revisit this issue to validate the continued use of integers to specify code lists. The specific questions that are asked are:

1. Should the TCIP TWG continue to use integers to define their code lists or should they migrate to the Enumerated type?
2. Should the TCIP TWG change some (or all) of the integer defined codes to Enumerated type code lists?

2. Background: Code List Defined

The TCIP data dictionary elements are syntactically defined using Universal Types in the Abstract Syntax Notation One standard (ITU-T X.680 – 12/97). A code or attribute list, such as CPT-DayofWeek or CPT-StopPointAttribute, contains a list of types that characterize the concept. For example, CPT-DayofWeek is a code list of the days of a week, including:

```
sunday ( 1 )  
monday ( 2 )  
tuesday ( 3 )  
wednesday ( 4 )  
thursday ( 5 )  
friday ( 6 )  
saturday ( 7 )
```

where a number is associated with each type or characteristic. This is true both of enumerated types and integer types. In an integer type, a value may be associated and compiled as part of the syntactic description.

Conceptually, there are different types of code lists. Codes may be specified by other industries or standard bodies, such as state designators, mode types, days of week, gender types. Other code lists may be typical within an industry, but specific groupings or varieties are specific to the implementation, work rules, or deployment of resources, e.g., time point time types, stop point attributes, day and service types.

3. Background: Current Practice

Currently, TCIP1 defines all code lists as integers. Specific values of the range are assigned different meaning. For a byte constrained integer (256 bits), the values 150 to 255 are reserved for local use. Local use means that a local authority may specify those values. Different authorities may define those local use codes differently, they may be “unique” to each authority.

The recommended practice applied to the use of local codes is that the authority that defines one or more local use codes supports a CPT-CodeList message. The CPT-CodeList message contains the name of the organization, the code list and the list of local use codes defined for each TCIP data element. This message serves as a look-up table for code lists that specify user defined codes.

4. What is the Question?

The enumerated type does not provide the flexibility an integer type provides; that is, *enumerated types assume the values assigned and no other*, according to the ASN.1 standard. The exclusiveness of enumerated types is both its strength and weakness. Given that there are two types of code lists, enumerated types may have a place in representing other code lists that do not often change, or code lists that are restricted by another authority. For example, *mode* type is constrained by the Federal Transit Database; *day of week*, *gender*, *month*, *state*, and *county* codes conform to other international and ANSI standards. Local use codes are not relevant and are not desired for these types of code lists.

On the other hand, this question may be moot in light of the initiative to promulgate a standard ITS database that incorporates code lists that are generic across transportation organizations (traffic, emergency, fleet management, etc.). Most of the TCIP data elements that may be suggested for conversion to enumerated types such as CPT-Sex, CPT-DayofWeek, etc., are data elements identified for “globalization” to the ITS Database.

5. Proposed Recommendation

In answer to the Problem Statement Questions:

1. & 2. Do nothing with existing TCIP data elements.

1. With respect to new ones, define data elements that are regulated by other authorities as enumerated types, and ones that require “controlled” flexibility as integers with a series of their values assigned to “local use”.

Appendix E: White Paper: Use of Error Codes in TCIP Data Elements

1. Problem Statement

The TWG expressed a need to include a way to provide error processing related to data exchange. The question was posed to the TWG to eliminate the error codes (codes 245-255) from NTCIP 1401 (CPT), 1403 (PI), 1404 (SCH), and 1405 (SP), as the working groups for NTCIP 1402 and 106-1408 did. The argument for eliminating them came from anticipating that the TCIP Dialogs would replace the need for the internal error codes. Further, the error codes only applied to data elements that were represented as codes, and not all data elements.

This white paper explores the issues related to replacing the error codes within the data elements represented as codes by something else (in the absence of a TCIP Dialog standard).

2. Background

During the development of TCIP data dictionary, one of the participants recommended error codes be included in data elements that were represented as “codes”. This suggestion was adopted by the general TWG at the Orange County meeting (1998). Later, the Onboard/Control Center, Fare Collection and Incident Management Working Groups made the case that the codes only related to one class of data elements and not all. They surmised that the TCIP Dialogs effort would deal with Error Codes.

In the Dialogs Phase 1 effort, the TCIP Dialogs working group proposed four categories of Dialogs, “error processing” was one of them. The Error Processing dialog requirement included codes for data elements, messages and general/specific dialogs. The numbering scheme that classifies the types of errors as stated in the [Dialogs] is included below. The errors for data element errors were derived from the list in the TCIP standards NTCIP 1401 and 1403-1405.

Code	Category
0-49	Message Errors
50-99	General Dialog Error
100-199	Specific Dialog Errors
100-124	• Event Processing Errors
125-149	• Data Provision Errors
150-159	• Journal Provision Errors
200-255	Data Element Errors

The Error Processing dialog could be executed within any dialog if an “error” was detected. The error “message template” would be executed instead of, or in addition to an expected API/template, message or data element.

3. Requirements

The requirements as stated by the TWG are as follows:

- Provide error processing/informational message related to all TCIP objects, including data element, message and data elements inside of messages. (In the absence of dialogs, dialogs is currently not included in the requirement)
- Provide information on the type of error; minimally, incorporate the list of ten (10) from the original TCIP error list:
 - Null (data is null)
 - Intentionally left blank (not used)
 - Deleted by device (reset to null)
 - Data unavailable
 - Illegal calculation (e.g., divide by zero)
 - Value out of range
 - Device malfunction (no value returned)
 - Data expired (data deleted, no longer available)
 - Data suppressed for security or privacy
 - Unspecified

4. Issues and Alternatives

Alternative 1: Do nothing.

Description -- Leave the business area code numbers as is.

Logic – The fewer changes to the existing standard the better.

Deficiency -- Does not meet requirements of TWG.

Alternative 2: Take all the codes out.

Description – Take out all the error codes in TCIP data elements represented as codes in 1401, 1403-1405.

Logic – Makes all TCIP data elements consistent.

Deficiency -- Does not meet requirements of TWG.

Alternative 3: Create a message that alerts target system that an error has occurred.

Description – Alternative 2, and create a new message and data element that may be used for identifying errors in exchanging (all types of) TCIP objects.

Logic – Good programming practice includes an error processing function within a module to handle potential or expected errors, e.g., divide by zero, invalid data. This description implies “behavior” of an application. By definition, a data interface standard codifies the data, not the behavior. The function of a Dialog is to standardize the behavior of exchange. So by scope, the Dialogs standard should be responsible for how and when an error processing message is sent. However, the message and/or template for an error processing message may fall under the general TCIP data dictionary umbrella and be included in the Common Public Transportation (CPT) data dictionary/message set.

Deficiency -- Effort is not coordinated with Dialogs since the Dialogs standard effort is on hold.

Proposed Message –

The message “scope of operations” would work as follows:

A response or event is expected from a target system. The target system determines that it cannot respond as expected because of an error. The error message should contain the following fields:

- Request or event that was expected such as reference to get, request, event-subscribe
- TCIP object reference that was expected (may be embedded object such as a data element within a message)
- Reason for not responding

The message may be described as follows:

Message Identifier: cpt xx
Metadata Source: DIRECT
Descriptive Name: CptErrorTemplate_message
Descriptive Name Context: Manage Transit
Definition: Describes the error that occurred in responding to TCIP interchange
Source: TCIP
Class Name: CPT
Classification scheme name: TCIP
Classification scheme version: NTCIP 1400
Data concept type: Message
Keyword:
Related data concept:
Relationship type:
Remarks:
Symbolic name:
Symbolic name usage:
ASN.1 name: CptErrorTemplate
Constraints:
Synonymous descriptive name:
Synonymous descriptive name context:
Priority: Priority
Frequency/Message Mode: as needed -- Map to Dialog Requirement
Delivery Verification: none -- Map to Dialog Requirement
Message body:

```
CptErrorTemplate ::= SEQUENCE {
    address OBJECT IDENTIFIER OPTIONAL, -- source device
    reference OBJECT IDENTIFIER, -- reference to TCIP object
    sub-reference UTF8String (1..25) OPTIONAL,
```

```
-- reference to field within message or message within dialog
error-code      CPT-ErrorType,
footnote        CPT-Footnote  OPTIONAL }
```

Just one data element is associated with the new message, and that is the CPT-ErrorType. It is described below:

Descriptive Name CPT_ErrorType_cd
Descriptive Name Context: Manage Transit
Definition: Indicates the type of error that occurred in response to a request or event.
Formula:
Source: TCIP
Class Name: CPT
Classification scheme name: TCIP
Classification scheme version: NTCIP 1400
Data concept type: Data Element
Keyword:
Related data concept:
Relationship type:
Remarks:
Symbolic name: cptdd xxx
Symbolic name usage: TCIP Classification Tree for CPT Data Dictionary
ASN.1 name: CPT-ErrorType
Representation layout: INTEGER (0..255)
Constraints:

Value Domain: UBYTE

Code	Category
0-49	Message Errors
50-99	General Dialog Error
100-199	Specific Dialog Errors
100-124	• Event Processing Errors
125-149	• Data Provision Errors
150-159	• Journal Provision Errors
200-255	Data Element Errors

```
200 data-null --null (data is null)
201 data-blank --intentionally left blank (not used)
202 data-deleted -- deleted by device (reset to null)
203 data-unavailable-- data unavailable
204 data-illegal
    -- illegal calculation (e.g., divide by zero)
205 data-out-of-range --value out of range
206 data-malfunction--device malfunction (no value returned)
207 data-expired
    -- data expired (data deleted, no longer available)
208 data-suppressed -- data suppressed for security or privacy
```

209 data-unspecified -- unspecified

Data type: UNIVERSAL 2 – Integer Type

Representation class term: code

Valid value rule:

```
CPT-ErrorType ::= INTEGER {
  -- 0 to 49 are reserved for message errors
  -- 50 to 99 are reserved for general dialog errors
  -- 100 to 199 are reserved for specific dialog errors
  -- 200 to 255 are reserved for data element errors
  data-null (200),
  data-blank (201),
  data-deleted (202),
  data-unavailable (203),
  data-illegal (204),
  data-out-of-range (205),
  data-malfunction (206),
  data-expired (207),
  data-suppressed (208),
  data-unspecified (209)
  -- 210 to 255 are reserved for data element errors
} (0..255)
```

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