DRAFT

GCM

Gary - Chicago - Milwaukee ITS Priority Corridor

Corridor Transportation Information Center

Interface Control Specification
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GARY-CHICAGO-MILWAUKEE CORRIDOR
CORRIDOR TRANSPORTATION INFORMATION CENTER
INTERFACE CONTROL SPECIFICATION DOCUMENT

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GARY-CHIGAGO-MILWAUKEE CORRIDOR
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INTERFACE CONTROL SPECIFICATION DOCUMENT

1 INTRODUCTION

The Requirements Specification Document (#9933.04) identifies the overall system level requirements of the Gary-Chicago-Milwaukee (GCM) Corridor Transportation Information Center (C-TIC). This document provides details about the data and control flow contents among the C-TIC internal subsystems and external data connections.

1.1 PURPOSE

1.1.1 Goals of this Document

The GCM C-TIC Interface Control Specification has the goal of establishing the basis for agreement between the system designers and developers on how each interface is to perform. Additionally, it provides the interface control documentation process to permit the interface design to evolve along with the general project design. This specification reflects current knowledge of C-TIC interfaces.

1.1.2 Intended Audience

The GCM C-TIC Interface Control Specification is intended for:

- The GCM Architecture, Communication, and Information Work Group, in that it provides a system overview of the C-TIC concept.
- Members of the various design groups that have requirements and development responsibility.
- Other interested parties who map be contemplating the design of a similar transportation information clearinghouse system.

1.1.3 Document Organization

1.2 SCOPE

This document provides interface definitions for flows required in the GCM C-TIC system. This document is concerned with flows between automated components that are internal and external to the C-TIC system.

1.3 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

Document # 9936.01 contains all definitions, acronyms, and abbreviations associated with this project. It also contains information relating to ITS, communications, and other standards.

1.4 REFERENCES

2 C-TIC DATA STRUCTURES

2.1 OVERVIEW

2.2 MESSAGE TYPES

2.3 LOCATION REFERENCING

2.4 DATETIME

3 INBOUND MESSAGES

3.1 ILLINOIS

3.1.1 TSC Data Stream

This flow represents the real-time loop detector data collected by the IDOT Traffic System Center (TSC.) The data includes volume and occupancy data collected by loop detectors on specific IDOT controlled expressways.

3.1.1.1 General Description

Volume and occupancy data is transmitted to the C-TIC through this data stream. Incident information and construction/maintenance information will be provided to the C-TIC through alternate means.

Data from the TSC is received via a telephone line/modem connection. The line operates at 9600 baud, 8 data bits, no parity, one start bit, one stop bit. The C-TIC connection is configured as a DTE, emulating a VT-340 terminal.

3.1.1.2 Message Structure and Content

```
$@V<CR><LF>
hh:mm:ss DD-MMM-YY<CR><LF>
XXXV1V2V3V4V5V6V7....Vn<CR><LF>
...
XXXV1V2V3V4V5V6V7....Vn<CR><LF>
#.V<CR><LF>
$@O<CR><LF>
hh:mm:ss DD-MMM-YY<CR><LF>
XXXO1O2O3O4O5O6O7....On<CR><LF>
...
XXXO1O2O3O4O5O6O7....On<CR><LF>
#.O<CR><LF>
```

Figure 3-1 TSC Loop Detector Data

The message occurs once per minute. The $@V and #.V lines bracket the volume information. The $@O and $.O lines bracket the occupancy information. hh:mm:ss DD-MMM-YY are the time and date of the report, which will be identical for volume and occupancy. Each data line consists of an *expressway code (XXX)* (e.g., CAO is Calumet Outbound) followed by 2 digit numbers representing the volume (Vn) or occupancy (On) for each detector. Inoperative detectors are represented by '-1'. Leading zero digits are represented by space. Lines over 79 characters long are split onto the next line.

3.1.1.3 Triggering Event

C-TIC software initiates and maintains the connection to the TSC. Emulating a VT-340 terminal, the C-TIC software dials the TSC, negotiates the baud rate, and establishes connections. The software emulates human interaction to access the Realtime Data 1 minute volume and occupancy screens. Thereafter, the TSC

autonomously outputs a complete data set every minute.

3.1.1.4 Responses

If the C-TIC loses the connection to the TSC it will then send an alert to the console operator and attempt to reestablish communications. The C-TIC will log the interruption and resumption of TSC communications on the C-TIC log file.

The TSC may occasionally change the format of the message, especially when new detectors are added. If the message format received by the C-TIC does not match the expected format, a C-TIC operator message will be generated (and logged), and the affected expressway data will be treated as though the detectors are inoperative.

3.1.1.5 System Issues

None.

3.1.2 Northwest Central Dispatch

The C-TIC is connected to the computer aided dispatch center for Northwest Central Dispatch (NWCD) in Arlington Heights, IL. NWCD serves as the Police and Fire dispatch agency for six (6) Northwest Chicago communities. NWCD handles traffic and non-traffic related emergency incidents. Traffic related incidents are filtered at NWCD and sent to the C-TIC.

A leased line exists between NWCD and the C-TIC. A PC was placed at NWCD to monitor records printed on the log printer. When an incident occurs that passes through the PC filter at NWCD, it is then transmitted to the C-TIC.

3.1.2.1 General Description

When an incident is entered into the NWCD database it is also received by the C-TIC software at NWCD. The NWCD PC acts as a filter between the NWCD log printer and the C-TIC. It examines log printer data and classifies each incident observed as filtered or non-filtered. If filtered (i.e., non-traffic incidents such as burglaries or domestics), then the PC discards the information on that line of the printer. If non-filtered (i.e., traffic related incident), then the PC forwards each line to the C-TIC.

3.1.2.2 Information Content

	Interface Type	**Duration/ Frequency**	**Release Phase**
• Incident Declaration Information - Incident number - Date and time of incident entry - Entry operator ID - Date and time of incident dispatch - Dispatched operator ID	Async	Event Driven	1

	Interface Type	Duration/ Frequency	Release Phase
• Incident Response Activity - Incident number - En route time and data - On scene time and data	Async	Event Driven	1
• Incident Information - Incident number - Initial incident type - Initial Alarm Level - Final incident type - Final alarm Level - Priority - Disposition - Mpage - Group - Source - Location of incident	Async	Event Driven	1
• Location Information: - Incident number - Name - Address - Duration - Phone number	Async	Event Driven	1

Table 3-1 NWCD Information Content

3.1.2.3 Message Structure and Content

Each message starts with the control character "STX" and ends with the control character "ETX". The byte after the ETX is a checksum byte that is used to determine if the message was received intact or not. The LRC is calculated at the C-TIC in the same manner as it is calculated at NWCD.

STX	char	8	$02
msg data	char	8*n	one line
ETX	char	8	$03
LRC	char	8	XOR sum of all msg data

If the received LRC character matches at the C-TIC, an ACK character is sent back to the NWCD PC. If the LRC does not match, a NAK is sent and the NWCD PC sends the line again. The NWCD PC also resends a line if no response is received from the C-TIC after one (1) second. After three (3) retries, the NWCD PC discards the line and continues with the next line.

NWCD Incident Message	
Data Structure	Incident No+Date of Dec+Tim of Dec+Dec Operator ID+Date of Dis+Time of Dis+Dis Operator ID+Initial incident type+Initial Alarm level+Final incident type+Final Alarm level+Mpage+Group+Beat + policeIHN + fireIHN + streetName + crossStreet + streetAddr + textMsg

field	type	bits	description
Incident number	char	32	Incident History Number
Date of declaration	char	16	Date that incident was declared
Time of declaration	char	16	Time of day that incident was declared
Declation operator ID	char	32	Operator ID
Date of dispatch	char	16	Date that incident was dispatched
Time of dispatch	char	16	Time of day that incident was dispatched
Dispatched operator ID	char	32	ID of operator that dispatched the call
Initial incident type	unsigned	8	Initial determination of incident type
Initial alarm level	unsigned	8	Initial determination of incident alarm level
Final incident type	unsigned	8	Final determination of incident type
Final alarm level	unsigned	8	Final determination of incident alarm level
Mpage	unsigned	8	
Group	unsigned	8	
Beat	unsigned	8	
policeIHN	char	128	NWCD Police Incident History Number
fireIHN	char	128	NWCD Fire Incident History Number
streetName	char	64	Major street name
crossStreet	char	64	Cross street name
streetAddr	char	8	Street address number
textMsg	char	256	A message indicating details of an incident
Message size	**864 bits or 108 bytes**		

Table 3-2 NWCD Message Structure

3.1.2.4 Triggering Event

The NWCD incident database log printer is continuously monitored. The Incident Message is generated by the NWCD preprocessor when a new traffic related incident has been received and entered into the NWCD system.

3.1.2.5 Responses

The C-TIC will store this information in its database and automatically generate an incident report on the C-TIC. If the C-TIC is unable to automatically identify the location, then the operator will enter the information as an

anecdotal input to the system.

3.1.2.6 System Issues

None.

3.1.3 IDOT Closed Loop Signal System (CLSS)

This flow represents the information generated by the Closed Loop Signal System on Dundee Road. The data is currently not documented here.

3.1.3.1 General Description

Every five (5) minutes each of the two (2) masters will dial the C-TIC. The C-TIC contains the communication protocols used by the Econolite software package. The C-TIC will receive smoothed volumes and occupancies for each available detector. The data received will be in ASCII format as specified by Econolite and is not documented in this document. The volumes and occupancies will then be converted to their raw values and used to calculate travel times along Dundee Road from IL-53 to Milwaukee Avenue.

3.1.3.2 Message Structure and Content

The message structure is specified by Econolite and is proprietary.

3.1.3.3 Triggering Event

Every five (5) minutes, each of the masters will dial the phone line connected to the C-TIC. There are no retries for the five (5) minute data. If the connection cannot be made, then the current five (5) minute data set will be lost.

3.1.3.4 Responses

The C-TIC will receive the ASCII data and will have to parse out the volumes and occupancies.

3.1.3.5 System Issues

None.

3.1.4 SSI Interface

3.1.4.1 General Description

An SSI computer exists at the IDOT District 1 building that communicates with remote weather sensors. SSI will develop special software that will gather the weather data and store it in a file. When polled, it will transmit the file to the C-TIC. The weather data is then displayed in a window for the operator.

The C-TIC-SSI connection will use the PPP (Point-to-Point Protocol) to establish a LAN (local area network) connection using the TCP/IP network layer protocol.

3.1.4.2 Information content

	Interface Type	Duration/ Frequency	Release
• Report Messages - Strong winds - Low visibility - Snowing - Blizzard alert - Blowing snow - Heavy rain - Air temperature - Wet roads - Possible icing - Possible frost - Freezing rain	Sync	Event Driven	1
• Surface Condition - System initialization - Communication fail - Dry - Wet - Chem Wet - Snow/Ice - Absorptn - Absrptn2 - Dew - Frost - Ab@DewPt - Frost2 - S/I Alrt	Sync	Event Driven	1
• Precipitation Type - No precipitation - Precipitation prsent but unclassified - Rain - Snow - Mixed rain and snow - RPU-to-sensor communications failure - Sensor failure	Async	Event Driven	1
• Precipitation Intensity - Precipitation intensity information not available - Light - Moderate - Heavy	Async	Event Driven	1

Table 3-3 SSI Information Content

3.1.4.3 Message Structure and Content

The C-TIC transfers the SSI RPU (Remote Processing Unit) data file every five (5) minutes using the FTP (File Transfer Protocol) over the leased line.

The file structure is determined by SSI.

Weather Message			
Data Structure			
field	**type**	**bits**	**description**
RpId	unsigned	8	Remote Processing Unit (RPU) ID
RpDtTm	unsigned	8	RPU timestamp (GMT date/time)
RpCTim	unsigned	8	RPU internal timestamp (GMT sec. since 1/1/70)
ApAirT	unsigned	8	Air temperature (deg C)
ApDewT	unsigned	8	Dew point temperature
ApPcpR	unsigned	8	Precipitation rate (mm/hr)
ApPcpA	unsigned	8	Precipitation accum. since midnight local time (mm)
ApWsAv	unsigned	8	Wind speed average (km/hr)
ApWsGu	unsigned	8	Wind speed gust (km/hr)
ApDirN	unsigned	8	Wind direction (minimum speed) (deg from N)
ApDir	unsigned	8	Wind direction (deg from N)
ApDirX	unsigned	8	Wind direction (maximum speed) (deg from N)
ApRh	unsigned	8	Relative humidity (%)
ApPcT	unsigned	8	Elapsed time since last precipitation (minutes)
ApPcY0	unsigned	8	Precipitation type; sensor #1 (see Table 3-5)
ApPcI0	unsigned	8	Precipitation intensity; sensor #1 (see Table 3-6)
ApPcY1	unsigned	8	Precipitation type; sensor #2 (see Table 3-5)
ApPcI1	unsigned	8	Precipitation intensity; sensor #2 (see Table 3-6)
ApVis	unsigned	8	Surface visibility (km)
SfTemp0	unsigned	8	Pavement surface temp.: sensor #1 (deg C)
SfsubT0	unsigned	8	Pavement subsurface temp.: sensor #1 (deg C)
SfChem0	unsigned	8	Pavement surface chemical factor: sensor #1
SfStat0	unsigned	8	Pavement surface status: sensor #1 (see Table 3-7)
SfDep0	unsigned	8	Pavement surface precip. depth: sensor #1 (mm)
SfIceI0	unsigned	8	Pavement surface ice index: sensor #1
SfFrzT0	unsigned	8	Pavement surface precip. initial freezing temp: sensor #1 (deg C)

Weather Message			
Data Structure			
field	**type**	**bits**	**description**
SfCpct0	unsigned	8	
SfTemp1	unsigned	8	Pavement surface temp.: sensor #2 (deg C)
SfSubT1	unsigned	8	Pavement subsurface temp.: sensor #2 (deg C)
SfChem1	unsigned	8	Pavement surface chemical factor: sensor #2
SfStat1	unsigned	8	Pavement surface status: sensor #2 (see Table 3-7)
SfDep1	unsigned	8	Pavement surface precip. depth: sensor #2 (mm)
SfIceI1	unsigned	8	Pavement surface ice index: sensor #2
SfFrzT1	unsigned	8	Pavement surface precip. initial freezing temp: sensor #2 (deg C)
SfCpct1	unsigned	8	
SfTemp2	unsigned	8	Pavement surface temp.: sensor #3 (deg C)
SfSubT2	unsigned	8	Pavement subsurface temp.: sensor #3 (deg C)
SfChem2	unsigned	8	Pavement surface chemical factor: sensor #3
SfStat2	unsigned	8	Pavement surface status: sensor #3 (see Table 3-7)
SfDep2	unsigned	8	Pavement surface precip. depth: sensor #3 (mm)
SfIceI2	unsigned	8	Pavement surface ice index: sensor #3
SfFrzT2	unsigned	8	Pavement surface precip. initial freezing temp: sensor #3 (deg C)
SfCpct2	unsigned	8	
SfTemp3	unsigned	8	Pavement surface temp.: sensor #4 (deg C)
SfSubT3	unsigned	8	Pavement subsurface temp.: sensor #4 (deg C)
SfChem3	unsigned	8	Pavement surface chemical factor: sensor #4
SfStat3	unsigned	8	Pavement surface status: sensor #4 (see Table 3-7)
SfDep3	unsigned	8	Pavement surface precip. depth: sensor #4 (mm)
SfIceI3	unsigned	8	Pavement surface ice index: sensor #4
SfFrzT3	unsigned	8	Pavement surface precip. initial freezing temp: sensor #4 (deg C)
SfCpct3	unsigned	8	

Weather Message			
Data Structure			
field	**type**	**bits**	**description**
Message size	**408 bits or 51 bytes**		

Table 3-4 SSI Message Structure

Precipitation Type	**Code**
No precipitation	0
Precipitation present but not classified	1
Rain	2
Snow	3
Mixed rain and snow	4
RPU-to-sensor communications failure	29
Sensor failure	30

Table 3-5 SSI Precipitation Types and Codes

Precipitation Intensity	Code
Precipitation intensity information not available	0
Light	2
Moderate	3
Heavy	4

Table 3-6 SSI Precipitation Intensities and Codes

3.1.4.4 Triggering Event

None.

3.1.4.5 Responses

The C-TIC will receive a file from SSI containing weather information from sensors in the test area. The data is then displayed on the C-TIC operator's screen.

3.1.4.6 System Issues

None.

3.1.5 *999

3.1.5.1 General Description

This message will contain incident information which is determined to have an impact on traffic conditions. The information will include incident location and type.

3.1.5.2 Message Structure and Content

3.1.5.3 Triggering Event

A trigger will be set up in the database at *999 to spawn a process when a new incident is entered in the database. This process will then packetize the incident information and send it to the modem.

3.1.5.4 Responses

3.1.5.5 System Issues

It has not yet been determined the format in which this information will arrive directly into the C-TIC.

3.1.6 Illinois State Toll Highway Authority (ISTHA)

3.1.6.1 General Description

This message will contain travel times on the Illinois Tollway that are collected using the I-Pass electronic toll collection system. ISTHA will also provide construction and maintenance information daily via Fax.

3.1.6.2 Message Structure and Content

3.1.6.3 Triggering Event

3.1.6.4 Responses

3.1.6.5 System Issues

3.1.7 Regional Transportation Authority (RTA)

3.1.7.1 General Description

The RTA will provide static and dynamic schedule information for the following agencies: RTA, Pace, Metra, and the CTA.

3.1.7.2 Message Structure and Content

3.1.7.3 Triggering Event

3.1.7.4 Responses

3.1.7.5 System Issues

3.1.8 911

3.1.8.1 General Description

This message will contain incident information which is determined to have an impact on traffic conditions. The information will include incident location and type.

3.1.8.2 Message Structure and Content

3.1.8.3 Triggering Event

3.1.8.4 Responses

3.1.8.5 System Issues

It is assumed that this interface will be similar to that for NWCD.

3.1.9 IDOT Communications Center

3.1.9.1 General Description

This message will contain information from the following sources:

- Highway Advisory Radio (HAR)
- Minute Men
- IDOT Maintenance and Construction

This source will provide incident locations and expected durations, weather information, and construction information. IDOT maintenance and construction information will be provided daily via Fax into the C-TIC.

3.1.9.2 Message Structure and Content

3.1.9.3 Triggering Event

3.1.9.4 Responses

3.1.9.5 System Issues

3.1.10 State/Local Police

3.1.10.1 General Description

3.1.10.2 Message Structure and Content

3.1.10.3 Triggering Event

3.1.10.4 Responses

3.1.10.5 System Issues

3.1.11 Private Broadcasting

3.1.11.1 General Description

3.1.11.2 Message Structure and Content

3.1.11.3 Triggering Event

3.1.11.4 Responses

3.1.11.5 System Issues

3.1.12 Chicago Skyway

3.1.12.1 General Description

3.1.12.2 Message Structure and Content

3.1.12.3 Triggering Event

3.1.12.4 Responses

3.1.12.5 System Issues

3.1.13 Other Traffic Signal Systems

3.1.13.1 General Description

3.1.13.2 Message Structure and Content

3.1.13.3 Triggering Event

3.1.13.4 Responses

3.1.13.5 System Issues

3.2 INDIANA

3.2.1 Borman Expressway Traffic Management Center

3.2.1.1 General Description

The Borman Expressway TMC acts as the focal point for all information from Indiana which is sent to the C-TIC. Although this is the only message inbound from Indiana to the C-TIC, it contains data streams from a variety of sources including:

- State/Local Police
- 911
- Private Broadcasting organizations
- Borman Expressway TMC (VDS, RMS, CMS, HAR, Hoosier Helpers)

- Transit systems
- Weather systems
- InDOT maintenance
- Indiana Toll Authority

3.2.1.2 Message Structure and Content

3.2.1.3 Triggering Event

3.2.1.4 Responses

3.2.1.5 System Issues

3.3 WISCONSIN

3.3.1 MONITOR Traffic Management Center

3.3.1.1 General Description

The MONITOR TMC acts as the focal point for all information from Wisconsin which is sent to the C-TIC. Although this is the only message inbound from Wisconsin to the C-TIC, it will contain data streams from a variety of sources. Releases 2 and 3 of the C-TIC implementation include the following information types:

- MONITOR TMC (VDS, RMS, CMS, CCTV)
- WISDOT maintenance/construction (scheduled events)

This section defines a detailed design of a bi-directional data communications interface between the C-TIC and the WisDOT MONITOR System in Milwaukee. The approach adopted in this design follows a Structured Design Methodology in order to facilitate a robust design which can be implemented in a cost efficient manner using PC technology and Commercial Off-the-Shelf (COTS) communications system components.

The design addresses a specific data interface to the MONITOR System via a PC workstation communications processor. The design specifically defines the interface between the Communications PC at the MONITOR System and the C-TIC System.

This interface is designed with respect to all of the functional and physical requirements outlined in the Requirements Specification Document (# 9931.04). It also reflects the most efficient, cost-effective approach to obtaining real-time traffic and incident data from the MONITOR System to be displayed and disseminated by the C-TIC.

3.3.1.2 Information Content

	Interface Type	Duration/ Frequency	Release
• Validated Link Data: - Time stamp - Link ID - Volume - Occupancy - Speed data - Status	Sync	Every 1 min.	2
• Route Travel Times: - Time stamp - Route ID - Travel time - Status	Sync	Every 5 min.	2
• Incident Information: - Time stamp - Link ID - Incident ID - Incident type - Duration - Impact - Description - Status	Async	Event Driven	2
• VMS information - Time stamp - Sign ID - Sign text - Status	Sync	Every 5 min.	2
• WisDOT maintenance/construction information. This would contain as a minimum, the following schedule event information: - Event type - Location time - Duration - Estimated impact	Async	Event Driven	3
• Weather Data	Sync	Every 15 min.	3
• State, County and Local Police Incident Information. This will contain, as a minimum the following: - Incident type - Incident location - Time of detection - Information on roadway conditions	Async	Event Driven	3

	Interface Type	Duration/ Frequency	Release
• 911 Systems. These systems will provide information on the following: - Incident type - Incident location - Time of detection	Async	Event Driven	3
• Metro Traffic/Shadow Traffic/other will provide information on roadway congestion and incidents such as: - Location - Estimated travel time	Sync	As Available	3
• Traffic Signal System will provide information on incident/malfunctions including: - Type - Incident type - Location - Estimated duration - from now - Detection time - Clearance time - Travel time data based on a link number on a five minute basis - 5/15 minute detector data	Async	Event Driven for Incidents Every 5 min. for detector data	3
• WisDOT will provide information on Hazmat monitoring data which will contain: - Detailed Hazmat information (i.e., route, time, type of load) - Incident type, incident location, etc.	Async	Event Driven	3
• Regional Bus/Railway Authority Information. These systems would provide information on: - Current bus/rail schedules - Real-time transit information - Incident information such as location, type, estimated duration.	Sync	Event Driven and Every 15 min. (As required for schedules)	3

Table 3-7 MONITOR Information Content

3.3.1.3 Message Structure

For Release 2, there are four (4) distinct messages that will be sent to the C-TIC from MONITOR. These messages are:

- Validated Lane Data
- Route Travel Times
- Incident Information
- VMS Information

Each message starts with the control character "STX" and ends with the control character "ETX". The byte after the ETX is a checksum byte that is used to determine if the message was received intact or not. The LRC is calculated at the C-TIC in the same manner as it is calculated at MONITOR. The basic message structure is as follows:

STX	char	8	$02
msg data	char	8*n	one line
ETX	char	8	$03
LRC	char	8	XOR sum of all msg data

If the received LRC character matches at the C-TIC, an ACK character is sent back to the MONITOR PC. If the LRC does not match, a NAK is sent and the MONITOR PC sends the line again. The MONITOR PC also resends a message packet if no response is received from the C-TIC after five (5) seconds. After three (3) retries, the MONITOR PC discards the message packet and continues with the next message packet.

Validated Lane Data Message			
Data Structure	msgType + link ID #1 + status + time stamp + volume + occupancy + speed +.....+ link ID #200 + status + time stamp + volume + occupancy + speed		
field	**type**	**bits**	**description**
msgType	unsigned	8	Message type = 60 Hex
Link ID #1	unsigned	8	MONITOR link ID #1
Status	unsigned	8	Status of loop detector information
Time stamp	unsigned	32	Time when data was created
volume	unsigned	8	Average Volume Veh/Hour
occupancy	unsigned	8	Average ocupancy
speed	unsigned	8	Average Speed Miles/Hour
...	...	...	...
Link ID #200	unsigned	8	Detector Station ID #200
Status	unsigned	8	Status of loop detector information
Time stamp	unsigned	32	Time when data was created
volume	unsigned	8	Average Volume Veh/Hour
occupancy	unsigned	8	Average occupancy (%)
speed	unsigned	8	Average Speed Miles/Hour
Message size	**80*(200 links) bits or 10*200 bytes**		

Table 3-8 Validated Lane Data Message Structure

Route Travel Times Message			
Data Structure	msgType +Route ID #1 + status + time stamp + travel time +.....+ Route ID #N + status + time stamp + travel time		
field	**type**	**bits**	**description**
msgType	unsigned	8	Message type = 50 Hex
Route ID #1	unsigned	8	Route ID
Status	unsigned	8	Status of route travel time information
Time stamp	unsigned	32	Time when data was created
Travel time	unsigned	8	Travel time on Route ID #1
...	...	...	...
Route ID #N	unsigned	8	Route ID
Status	unsigned	8	Status of route travel time information
Time stamp	unsigned	32	Time when data was created
Travel time	unsigned	8	Travel time on Route ID #N
Message size	**8+56*N bits**		

Table 3-9 Route Travel Time Message Structure

Incident Information Message			
Data Structure	msgType + status + time stamp + link ID+incident ID +incident type + impact + duration +description		
field	**type**	**bits**	**description**
msgType	unsigned	8	Message type = 40 Hex
Status	unsigned	8	Status of incident information
Time stamp	unsigned	32	Time when data was received at MONITOR
Link ID	unsigned	16	Location link ID
Incident ID	char	24	Unique incident identifier
Incident Type	unsigned	8	Incident type
Impact	unsigned	8	impact of incident
Duration	unsigned	8	Duration of incident

field	type	bits	description
Description	char	504	Operator input
Message size	**616 bits or 77 bytes**		

Table 3-10 Incident Information Message Structure

VMS Information Message			
Data Structure	msgType + status + time stamp + sign ID + sign text		
field	**type**	**bits**	**description**
msgType	unsigned	8	Message type = 30 Hex
Status	unsigned	8	Status of VMS information
Time stamp	unsigned	32	Time when data was created
Sign ID	unsigned	8	Sign identifier
Sign Text	char	128	Sign message
Message size	**184 bits or 23 bytes**		

Table 3-11 VMS Information Message Structure

3.3.1.4 Triggering event

The MONITOR system will send data in a continuous stream method. The C-TIC communications process will read and interpret the data stream. It will feed the referencing data to the translation process which will map the MONITOR link references to the C-TIC location referencing system.

This specific interface will not require a triggering mechanism but will respond with an acknowledgment back to the MONITOR communication interface PC.

3.3.1.5 Responses

If the C-TIC loses the connection to MONITOR it will attempt to reestablish communications. The C-TIC will log the interruption and resumption of MONITOR communications on the C-TIC log file.

MONITOR may occasionally change the format of the message, especially when new detectors are added. If the message format received by the C-TIC does not match the expected format, a C-TIC log message will be generated (and logged), and the affected data will be treated as though the detectors are inoperative.

4 OUTBOUND MESSAGES

This section details the messages generated within the C-TIC and distributed over various media to other agencies, value added resellers, and to the public.

4.1 INTERNET

The Internet connection consists of the entire Gary-Chicago-Milwaukee Web site. The static portions of the GCM Web site are produced using hypertext markup language (HTML) files and graphics interchange format (GIF) images that do not change to reflect current traffic conditions.

For Release 2, there will be two types of information being presented on the Internet. These types are:

- Congestion information
- Incident information.

Congestion information will be obtained from the IDOT TSC, MONITOR TMC and the Illinois State Toll Highway Authority TDS computer. This information will be presented in the form of congestion maps which contain color-coded roadways in the Gary, Chicago and Milwaukee areas.

4.1.1 IDOT TSC Congestion Information

4.1.2 MONITOR TMC Congestion Information

4.1.3 I-PASS Congestion Information

4.2 PROTECTED WEB PAGE

4.3 STATIC MAP

5 C-TIC INTERNAL INTERFACES

5.1 DATA TYPE AND RANGE

5.2 DATA STORES