IntelliTrac X Series

Protocol Document

Version: 2.1 (TA version)
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Status: Preliminary

General notes

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1 Introduction To IntelliTrac X Series Protocol (TA version)

This document describes the protocol of the IntelliTrac X Series devices. The S&T proprietary messaging protocol is used for all communications between the base and the device. This protocol incorporates error checking, message sequencing with full acknowledgement of received messages on request. The base station sends messages to the device and waits for an acknowledgement message from the device to indicates the status of the request. So this guide covers all protocol information you need to design and set up AVL applications incorporating the IntelliTrac X Series devices.

Note:

This document is for the special functions in addition to the standard version of firmware.

2 Version History

Version	What's new	Firmware version required	Hardware version required
2.1 TA	Add Tow function Add MILEAGECLR command Add MILEAGESET command Modified $ST+TRACKING command	V1.319TA or above V1.332TA or above	ST_2002_I or above

3 Scope of the document

This document presents the ST Command Set for the IntelliTrac X Series devices.

3.1 Related documents

IntelliTrac X Series Hardware Installation Guide

IntelliTrac Tracer Software User Manual

IntelliTrac InstallWizard User Manual

IntelliTrac ZoneManager User Manual

3.2 ST Command Syntax

The "$ST" or "$st" prefix must be set at the beginning of each command line. To terminate a command line enter <CR>.

Commands are usually followed by a response that includes <response><CR><LF>

Throughout this document, only the responses are presented, <CR><LF> are omitted intentionally.

Types of ST commands and responses :

Read command. This command returns the currently set value of the parameter or parameters

Test command $ST+XXXX=<…>,?<CR><LF>

Returns $XXXX=<…>,<…>,<…>, …<CR><LF>

Write command. This command sets user-definable parameter values.

Test command $ST+XXX=<…>,?<CR><LF>

Returns $OK:XXXX<CR><LF>

Default parameters are underlined throughout this document.

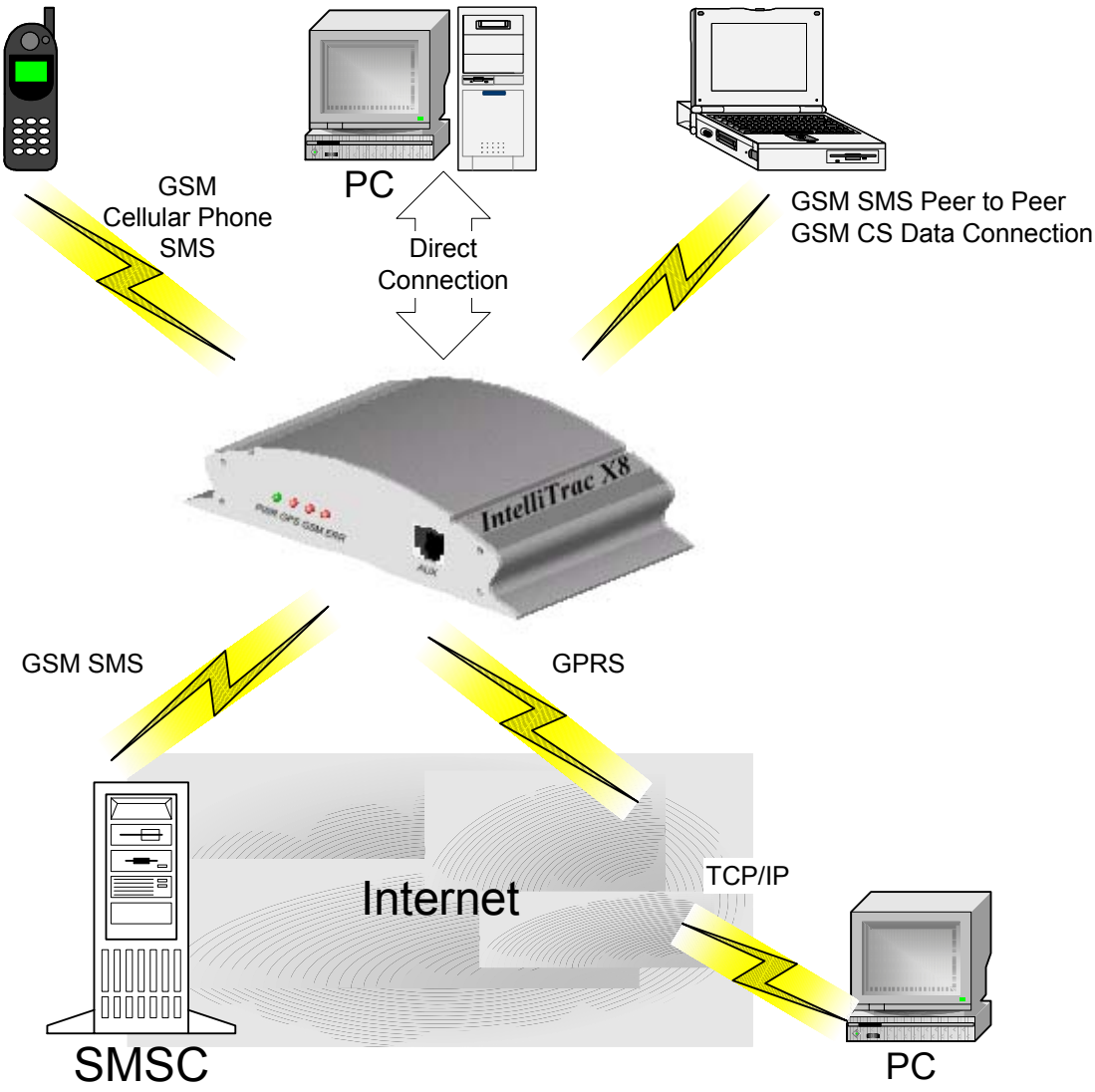
3.3 Entering successive ST commands on separate lines

When you enter a series of ST commands on separate lines, leave a pause between the preceding and the following command until the final response (for example $OK:XXXX) appears. This avoids sending too many ST commands at a time without waiting for a response for each.

Communications

The IntelliTrac X Series protocol could be transmitted to the IntelliTrac unit by several communication methods. Such as :

- Direct connection (Baud Rate : 57600bps)
- GSM CS Data connection (Baud Rate : 9600bps)
- GSM SMS messages (Peer to peer and TCP/IP network)
- GPRS TCP/IP, UDP/IP connection



For more detail GSM CS Data, SMS, TCP/IP information, please refer to GSM related documents.

4 Functions of TA version

4.1 Set Unit Parameters Commands

Command	Description
Tow	This command is used to use the GPS speed as the criteria to detect the unauthorized movement of vehicle.
$ST+TRACKING	This command is used to set Tracking command parameters.
$ST+MILEAGECLR	This command is used to reset the mileage to 0 in the mileage report.
$ST+MILEAGESET	This command is to set the Mileage and Max Speed status for the mileage report.

Tow function	Set unit identification number
Description	Execute this function to enable the unauthorized movement detection. If the GPS speed is great than 10 Km/hr over 30 seconds, the unit will send a alert message to the control center with Report ID 9.
Enable	Connect the Input 2 of IntelliTrac X8 to ACC of vehicle.
Disable	Connect the Input 2 of IntelliTrac X8 to permanent power source (12 or 24 V) or connect to the power source of IntelliTrac X8.

$ST+TRACKING	**Track position from the unit. (For control center)**	
Description	Execute this command to ask the unit to report back current GPS positional information to the control center according to the “Mode” parameter.	
Syntax	$ST+TRACKING=[Password], [Mode], [Time], [Distance], [Times], [Persist Tracking]	
Parameters for Tracking command	Password	The password of the unit. The default password is 0000.
	Mode	1 = Time mode A positional record is sent to the application when the time elapsed since the last position sent is greater than or equal to the time specified in parameter Time. 2 = Distance mode A positional record is sent to the application when the distance between the current GPS position and the last position sent is greater than or equal to the distance specified in parameter Distance. 3 = IntelliTrac mode A positional record is sent to the application as determined by proprietary algorithms. These algorithms attempt to minimize the amount of data sent back to the application while maintaining a high degree of map replay accuracy. 5 = Time mode + ACC checking: If ACC is off, the tracking function will be stopped. 6 = Distance mode + ACC checking If ACC is off, the tracking function will be stopped. 7 = IntelliTrac mode + ACC checking
	Time	Specify elapsed time. The time specified is in seconds and can be any number from 0 to 65535 seconds. Only whole numbers can be used. The minimum time interval in SMS mode is 15 seconds, and CSD/GPRS mode is 5 seconds.
	Distance	Specify elapsed distance. The distance specified is in meters and can be any number from 0 to 65535 meters. Only whole numbers can be used. The minimum distance interval in SMS mode is 300 meters, and CSD/GPRS mode is 100 meters.
	Times	Frequency. The range is from 0 to 65535. If Times=0, it means forever tracking.
	Persist Tracking	0: The unit stops reporting position back to the server continuously if there is no GPS. 1: The unit reports position back to the server continuously if there is no GPS reception (with the last position).

Return Value	$OK:TRACKING UnitID,DateTime,Longitude,Latitude,Speed,Heading,Altitude,Satellites, ReportID,InputStates,OutputStates, **Mileage, Max Speed,SMS SendingTime** Note: Mileage: the total mileage has traveled. MaxSpeed: the maximum speed during the trip. SMSSendingTime: the sending time (according to the Time Zone setting) when the message sends out from the unit.
Example	$ST+TRACKING=0000,1,15,0,5,0 $OK:TRACKING 1010000002,20040929101800,121.645337,25.063437,0,0,0,4,2,0,0,0,3.6,48,20040929101800 1010000002,20040929101815,121.645337,25.063437,0,0,0,4,2,0,0,0,3.6,48,20040929101815 1010000002,20040929101830,121.645337,25.063437,0,0,0,4,2,0,0,0,3.6,48,20040929101830 1010000002,20040929101835,121.645337,25.063437,0,0,0,4,2,0,0,0,3.6,48,20040929101835 1010000002,20040929101840,121.645337,25.063437,0,0,0,4,2,0,0,0,3.6,48,20040929101840 1010000002,20040929101845,121.645337,25.063437,0,0,0,4,2,0,0,0,3.6,48,20040929101845

$ST+MILEAGECLR	Reset the mileage in the mileage report.
Description	Execute this command to
Syntax	$ST+MILEAGECLR=[Password]
Reset Mileage	$ST+MILEAGECLR=0000
Parameters	Password The password of the unit. The default password is 0000.
Return Value	$OK:MILEAGECLR
Example	$ST+MILEAGECLR=0000 $OK:MILEAGECLR

$ST+MILEAGESET	**Set the mileage report**
Description	Execute this command to set the status of Mileage and Max Speed parameters for the mileage report.
Syntax	**Write** Command: $ST+MILEAGESET=[Password],[Mode],[Frequency] **Read** Command: $ST+MILEAGESET=[Password], ?
Parameters	Password: The password of the unit. The default password is 0000. Mode: 0 – Mileage(KM): Invalid; Max speed (Km/hr): Invalid 1 – Mileage(KM): Valid; Max speed (Km/hr): Invalid 2 – Mileage(KM): Invalid; Max speed (Km/hr): Valid 3 – Mileage(KM): Valid; Max speed (Km/hr): Valid **Note:** 1. If any above parameter is set to “Invalid”, the value in the mileage report would be incorrect. 2. The Maxspeed will return to 0 automatically when the mileage report is sent. Frequency: The unit will send the mileage report to the base station according the frequency (days). ?: For query unit parameters.
Return Value	**Write** Command Response: $OK:MILEAGESET **Read** Command Response: $MILEAGESET=[Mode],[Frequency]
Example	$ST+MILEAGESET=0000,0000,0,1 $OK:MILEAGESET $ST+MILEAGESET=0000,? $MILEAGESET=0,1

5 Appendices

5.1 Report ID Description

Report ID	Description	Remark
0	Position	
1	Log position	
2	Track position	
3	Timer report position	
4	Mileage report position	
5	Wrong password access report position	
6	ACC Off report position	
7	Immobilized report position	
8	Speeding report position	
9	Towed report position	
11	Input1 changed report position	
12	Input2 changed report position	
13	Input3 changed report position	
14	Input4 changed report position	
15	Input5 changed report position	
16	Input6 changed report position	
17	Input7 changed report position	
18	Input8 changed report position	
40	Main power low report position	
41	Main power lose report position	
100..119	User defined report position	

5.2 STD Errors Description

Error Code	Description
0	Unknown error
1	Base phone number not set
2	Unacceptable Incoming message
3	Unsupported DCS format
4	Outgoing voice call limited
5	Voice call busy
6	Voice call not connected
7	No Incoming voice call
8	Unsupported Report action
9	GPRS configuration error
10	Base station network error or GPRS communication error
11	GPRS TCP resend failure or TCP package error

5.3 CME Errors Description

Error Code	Description
3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required
6	PH-FSIM PIN required
7	PH-FSIM PUK required
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
14	SIM busy
15	SIM wrong
16	Incorrect password
17	SIM PIN2 required
18	SIM PUK2 required
26	Dial string too long
27	Invalid characters in dial string
30	No network service
31	Network timeout
32	Network not allowed emergency calls only
40	Network personalization PIN required
41	Network personalization PUK required
42	Network subset personalization PIN required
43	Network subset personalization PUK required
44	Service provider personalization PIN required
45	Service provider personalization PUK required
46	Corporate personalization PIN required
47	Corporate personalization PUK required
48	PH-SIM PUK required
100	Unknown
103	Illegal MS
106	Illegal ME
107	GPRS services not allowed
111	PLMN not allowed
112	Location area not allowed
113	Roaming not allowed in this location area
132	Service option not supported
133	Requested service option not subscribed
134	Service option temporarily out of order
148	Unspecified GPRS error
149	PDP authentication failure
150	Invalid mobile class
256	Operation temporary not allowed
257	Call barred
258	Phone is busy
259	User abort
260	Invalid dial string
262	SIM blocked

5.4 CMS Errors Description

Error Code	Description
1	Unassigned (unallocated) number
8	Operator determined barring
10	Call barred
21	Short message transfer rejected
27	Destination out of service
28	Unidentified subscriber
29	Facility rejected
30	Unknown subscriber
38	Network out of order
41	Temporary failure
42	Congestion
47	Resources unavailable, unspecified
50	Requested facility not subscribed
69	Requested facility not implemented
81	Invalid short message transfer reference value
95	Invalid message, unspecified
96	Invalid mandatory information
97	Message type non-existent or not implemented
98	Message not compatible with short message protocol state
99	Information element non-existent or not implemented
111	Protocol error, unspecified
127	Interworking, unspecified
128	Telematic interworking not supported
129	Short message Type 0 not supported
130	Cannot replace short message
143	Unspecified TP-PID error
144	Data coding scheme (alphabet) not supported
145	Message class not supported
159	Unspecified TP-DCS error
160	Command cannot be actioned
161	Command unsupported
175	Unspecified TP-Command error
176	TPDU not supported
192	SC busy
193	No SC subscription
194	SC system failure
195	Invalid SME address
196	Destination SME barred
197	SM Rejected-Duplicate SM
198	TP-VPF not supported
199	TP-VP not supported
208	D0 SIM SMS storage full
209	No SMS storage capability in SIM
210	Error in MS
211	Memory Capacity Exceeded
212	SIM Application Toolkit Busy
213	SIM data download error
255	Unspecified error cause

300	ME failure
301	SMS service of ME reserved
302	Operation not allowed
303	Operation not supported
304	Invalid PDU mode parameter
305	Invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
314	SIM busy
315	SIM wrong
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
320	Memory failure
321	Invalid memory index
322	Memory full
330	SMSC address unknown
331	no network service
332	Network timeout
340	NO +CNMA ACK EXPECTED
500	Unknown error or SMS collision
512	User abort
513	unable to store
514	invalid status
515	invalid character in address string
516	invalid length
517	invalid character in pdu
518	invalid parameter
519	invalid length or character
520	invalid character in text
521	timer expired
522	Operation temporary not allowed

5.5 LED Indicators Function

PWR LED Status	Function
Off	Power off
90 ms On / 2 secs Off	The device is running in power saving mode.
500ms On / 500ms Off	Reset procedure is in progress
On	Power on

GPS LED Status	Function
Off	The GPS is off or running in power saving mode.
1 sec On / 1 sec Off	No GPS satellites signal received
On	GPS Ready

GSM LED Status	Function
Off	The device is off or running in power saving mode.
600 ms On / 600ms Off	No SIM card inserted or no PIN entered, or network search in progress, or network login in progress.
90 ms On / 3 secs Off	Logged to network. No call in progress.
90 ms blinking 2 times / 3secs	GPRS Network connected
On	Voice/Data call connected

ERR LED Status	Function
Off	The device is ready
On	The device is not ready
Blinking	Please contact S&T technical support team.

5.6 About Systems & Technology Corporation

IntelliTrac X Series AVL device is produced by Systems & Technology Corporation. The company is a key developer and supplier of advanced systems in the Automatic Vehicle Location (AVL), Digital Map and Car Navigation Systems.

If you need information on other maps solutions or products, please contact us at the phone and fax numbers listed below, or visit our web sites.

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