Communication Specification and Data Format for

XT-2000-G-X001

Revision 1.0-A

Supports Firmware Revision X001-1111G2

XIRGO TECHNOLOGIES

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Device TCP/UDP Format for Periodic Location and Alert Messages

All periodic reporting and alert messages are TCP/UDP based.

Syntax: $$<UID>,<EV#>,<D>,<T>,<LT>,<LN>,<AL>,<SP>,<AC>,<DC>,<RP>,<HD>,<SV>,<HP>,<MI>,<MG>,<BV>,<CQ>,<GS>,<GT>,<FL>[,<SEQ>]##
Event Number:
4001: Periodic location reporting with ignition ON
4002: Periodic location reporting with ignition OFF
6001: Direction change alert
6002: Speed threshold alert
6003: RPM threshold alert
6005: Mileage threshold alert is exceeded
6006: Acceleration alert
6007: Deceleration alert
6008: Battery threshold alert
6012: Ignition OFF alert
6016: Idle Time threshold alert
6017: Towing Start alert
6018: Towing Stop alert
6030: Movement Start alert
6031: Movement Stop alert
6032: Park Time threshold alert

Syntax: $$<UID>,<EV#>,<D>,<T>,<LT>,<LN>,<AL>,<SP>,<AC>,<DC>,<RP>,<HD>,<SV>,<HP>,<MI>,<MG>,<BV>,<CQ>,<GS>,<FL>,<GT>[,<SEQ>]##
Event Number: 6011: Ignition ON alert

Syntax: $$<UID>,<EV#>,<D>,<T>,<LT>,<LN>,<AL>,<SP>,<AC>,<DC>,<RP>,<HD>,<SV>,<HP>,<MI>,<MG>,<BV>,<CQ>,<GS>,<XY>,<GT>,<FL>[,<SEQ>]##
Event Number: 6004: Geofence crossing alert

Syntax: $$<UID>,<EV#>,<D>,<T>,<LT>,<LN>,<AL>,<SP>,<AC>,<DC>,<RP>,<HD>,<SV>,<HP>,<MI>,<MG>,<BV>,<CQ>,<GS>,<VN>,<FWM>,<FWO>,<PF>,<GT>,<FL>[,<SEQ>]##
Event Number:
4006: Periodic location reporting while device powered (heartbeat)
6015: Alert message on Power up/Reset and GPS lock
6053: Alert message on VIN and GPS lock

Syntax: $$<UID>,6036,<D>,<T>,<LT>,<LN>,<AL>,<SP>,<AC>,<DC>,<RP>,<HD>,<SV>,<HP>,<MI>,<MG>,<BV>,<CQ>,<GS>,<GT>,<FL>,<SB>,<SD>[,<SEQ>]##
Event Number: 6036: Speed Band Duration alert

Syntax: $$<UID>,6045,<D>,<T>,<LT>,<LN>,<AL>, <SV>,<HP>,<GS>,<GT>,<MilStatus>,<DTC Count>,<DTC_Code_1> … <DTC_Code_n>[,<SEQ>]## Format DTC_Code_x = ASCII (e.g. P0110)
Event Number: 6045: Diagnostic Trouble Code List Change Alert

Syntax: $$<UID>,4050,<GSM>,<GPR>,<PDP>,<HOFF>,<HON>,<PU>,<R>,<%GPS>,<%GPSQ>,<%GSM>,<%GPR>,<%PDP>,<LV>,<HV>,<CX>,<DBO>,<ABI>,<DBI>,<SO>,<SI>,<SS>[,<SEQ>]##
Event Number: 4050: Diagnostic Data (Reference 7050 command for field definitions)

Syntax: $$<UID>,<4010>##
Event Number: 4010 PDP Timeout Refresh Heartbeat

Syntax Field Definition:

<UID>: Unit ID – 15 digits IMEI
<EV#>: Four digit event code that triggered the message
<D>: UTC Date of trigger (10 characters – YYYY/MM/DD)
<T>: UTC Time of trigger (8 characters – HH:MM:SS)
<LT>: Latitude (signed floating point number with 5 digits after decimal point)
<LN>: Longitude (signed floating point number with 5 digits after decimal point)
<AL>: Altitude (meters)
<SP>: Speed (mph) read from OBD
<AC>: Acceleration
<DC>: Deceleration
<RP> RPM read from OBD
<HD>: Heading (degrees)
<SV>: Number of satellites used for position fix
<HP>: HDOP (GPS accuracy figure of merit)
<MI>: Miles driven since last mileage threshold alert was sent. If disabled, this value will remain at zero
<MG>: Average fuel consumption in Miles/Gallon
<BV>: Battery voltage
<CQ>: GSM receive signal strength
<GS>: GPS status where 0=not locked, 1=locked, 2= no com and 3=GPS OFF power saving mode
<GT>: GPS Lost Lock Time, 5 digit resolution in minutes, 65535 max value
<FL>: Fuel Level
<XY> X=Geofence ID number and Y=1 is outside of fence violation and Y=2 is inside the fence violation
<FWM>: Main Firmware version
<FWO>: OBD Firmware version
<PF>: Profile Configuration is up to 7 alphanumeric characters. <FacDflt> and <Unknown> are unavailable
<VN>: Vehicle Identification Number
<SB>: Speed Band in which alert occurred
<SD>: Speed Band Duration: Time in seconds in band (65535 max value)
<Milstatus>: Malfunction Indicator Lamp, also known as the Check Engine light
<SEQ>: If UDPwAck mode is selected, SEQ is a 3 digit decimal sequence number from 0 to 255 which increments on each successful UDP with Ack response from server. Field is always at end of string (prior to ##) for UDPwAck and is omitted for TCP and UDP (w/o Ack) modes.

Server Response UDP ACK (TU=3) :

Description:

Server response message format when in UDPwAck mode for acknowledging receipt of reporting periodic location and alert messages. No response is used for TCP and UDP (w/o Ack) modes.

Syntax: +XT:UDP_ACK,<EV#>,<SEQ>##
Event Number: Applicable to 4xxx, 6xxx events or 7001 command responses when in UDPwAck mode

Syntax Field Definition:

<EV#>: Echo of 4 digit event code contained in received msg
<SEQ>: Echo of sequence number contained in received msg.

Server UDP Commands (TU=4) :

Description:

Server command format when in UDP with command (UPDC) mode. Not available for 1001, 1002, 1004, 1006, 1008, 1010,1011,1012,1013,1014

Syntax: +XT:<UID>,<*CMD*>,<*field1*>…<*fieldn*>##
Command Number: Applicable to 1003, 1005, 1007 and 3xxx, 5xxx or 7xxx commands when in UDPC mode

Syntax Field Definition:

<CMD>: 4 digit CMD code same as in SMS Command (ie:3001)
<fieldn>: Fields associated with particular CMD as defined in the SMS Commands

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Server Configuration Commands/Unit Response

- **Command: "+XT:1001,<PP>,<IP>,<TU>[,<PR>[,<PDPT>]]"- Sets Port, IP address and TCP or UDP**
  - **Response (via SMS):** $$<UID>,<1001>,<PP>,<IP>,<TU>,<PR>,<PDPT>##
    - <PP> is a numeric port number between 0 and 65,535
    - <IP> is an IP address in the form YYY.YYY.YYY.YYY **or** a DNS name
    - <TU> is TCP or UDP protocol: <TU>=1 TCP, <TU>=2 UDP, <TU>=3 UDPwAck, <TU>=4 UDPC
    - <PR> is de-activate PDP on call counter and activate on next call event, ≥ 1, 1 increments, 0 = disable, 40 max
    - <PDPT> is the PDP timeout in minutes, >= 30 minute, 1 minute increments, 0 = disable, 43200 max
    - *UDPwAck mode is described in Appendix 1*
    - *UDPC is the same as UDP (w/o Ack) except allows server commands sent via UDP (SMS cmd still supported).*
    - *In UDPC mode the server must use the last known IP and port from the device based on most recently received message.*
    - *If UDPC is selected <PR> should be set to 0*
    - *UDPC mode not available for GSM type A devices (see 1007)*

- **Command: "+XT:1002,<USN>,<PWD>,<NAME>"- Sets APN, username and password**
  - **Response (via SMS):** $$<UID>,<1002>,<USN>,<PWD>,<NAME>##
    - <USN> is APN user name, blank if not applicable
    - <PWD> is APN password, blank if not applicable
    - <NAME> is APN name

- **Command: "+XT:1003"- Query network settings**
  - **Response (via SMS, UDPC):**
    $$<UID>,<1003>,<PP>,<IP>,<USN>,<PWD>,<NAME>,<SM>,<TU>,<DCE>,<DCT>,<PR>,<PDPT>##
    - <SM> is server SMS number

- **Command: "+XT:1004,<DIR>,<FUSN>,<FPWD>,<FIP>[,<RTRY>]"- Sets FTP directory and login credentials for DOTA**
  - **Response (via SMS):** $$<UID>,<1004>,<DIR>,<FUSN>,<FPWD>,<FIP>[,<RTRY>]##
    - <DIR> is the subdirectory under which the DOTA files are stored
    - <FUSN> is the username used for login into the FTP
    - <FPWD> is the password used for login into the FTP
    - <FIP> is an IP address in the form YYY.YYY.YYY.YYY or a DNS name
    - <RTRY> number of times device will retry to DOTA from the FTP; ≥ 0 counts, 1 count increments, 0 = infinite retries, 10 max
    - *The port number is assumed to be 21*

- **Command: "+XT:1005"- Query FTP settings**
  - **Response (via SMS, UPDC):** $$<UID>,<1005>,<DIR>,<FUSN>,<FPWD>,<FIP>,<RTRY>##

- **Command**: **"+XT:1006,<bb>, <filename>"- Update firmware**
  - **Response- Confirm command (via SMS)**: $$<UID>,<1006>, <msg#>,<bb>,<filename> ##
    - <msg#> = 1 for initial request confirmation
    - <bb> signifies what to update: <bb> = 1 for Main FW, <bb> = 2 for OBD FW
    - <filename> is firmware file name (do not include the extension)
    - *Do not download older firmware into newer devices*
    - *1000, 3000 and 5000 series settings may be reset to default (reference release notes for download compatibility)*
  - **Response- Confirm new version of FW after update (via SMS):** $$<UID>,<1006>,<msg#>,<FWM>,<FWO>,<PF>##
    - Where <msg#> = 2 for update completion
    - <FWM> is Main Firmware Version
    - <FWO> is OBD Firmware Version

- **Command: "+XT:1007"- Query device firmware revisions**
  - **Response (via SMS, UDPC):** $$<UID>,1007,<FWM>,<FWO>,<PF>,<GV>##
    - <PF> is Profile configuration

- <GV> is a two digit parameter representing the GSM and GPS type respectively

- **Command: "+XT:1008,<SM>"- Sets SMS Number**
  - **Response (via SMS):** $$<UID>,<1008>,<SM>##
    - <SM> is server SMS number

- **Command:"+XT:1010,<PP>,<IP>,<USN>,<PWD>,<NAME>,<SM>,<TU>,<DCE>,<DCT>[,<PR>[,<PDPT>]"- Sets Port, IP address, Username, Password, APN, SMS number, Protocol and DNS interval**
  - **Response (via SMS):**
    $$<UID>,<1010>,<PP>,<IP>,USN>,<PWD>,<NAME>,<SM>,<TU>,<DCE>,<DCT>,<PR>,<PDPT>##

- **Command: "+XT:1011,<PR>"- Sets PDP Refresh on call counter**
  - **Response (via SMS):** $$<UID>,1011,<PR>##
    - <PR> is de-activate PDP on call counter and activate on next call event, ≥ 1, 1 increments, 0 = disable, 40 max
    - If UDPC is selected, PR must be disabled

- **Command:"+XT:1012,<PDPT>"- Sets PDP Refresh timeout.**
  - **Response (via SMS):** $$<UID>,<1012>,<PDPT>##
    - *<PDPT> is the PDP timeout in minutes, >= 30 minute, 1 minute increments, 0 = disable, 43200 max*
    - *If UDPC is selected, the PDPT is disabled.*
    - *Device will send a 4010 message every time the PDP gets refreshed based on the PDPT*

- **Command:"+XT:1013,<DCE>,<DCT>"- Sets DNS caching and interval**
  - **Response (via SMS):** $$<UID>,<1012>,<DCE>,<DCT>##
    - <DCE> is DNS cache enable/disable. 0=DNS cache disabled, 1=DNS cache enabled
    - <DCT> is DNS caching TTL in seconds. 0= Default (1hr), >1 sec, 999999 max

Server Interval/Threshold Commands/Unit Response

- **Command: "+XT:3001, <ONI>,<ONA>"- Sets Ignition ON reporting interval and alert**
  - **Response (via SMS, UDPC):** $$<UID>,3001,<ONI>,<ONA>##
    - <ONI> is periodic Ignition On interval in minutes: ≥ 0.5 min, 0.5 min increments, 0 = disable, 43200 max
    - <ONA> is Ignition On alert enable/disable: 0 = disable alert message, 1 = enable alert message
    - *EV# 4001 is squelched if idle (Ref: 3013) is enabled and detected*
    - *Periodic reporting event message for Ignition ON is **EV# 4001**.*
    - *Alert message for Ignition ON is **EV# 6011**.*

- **Command: "+XT:3002, <OFI>,<OFA>"- Sets Ignition OFF reporting interval and alert**
  - **Response (via SMS, UDPC):** $$<UID>,3002,<OFI>,<OFA>##
    - <OFI> is periodic Ignition Off interval in minutes: ≥ 10 min, 5 min increments, 0 = disable, 43200 max
    - <OFA> is Ignition Off alert enable/disable: 0 = disable alert message, 1 = enable alert message
    - *Periodic reporting event message for Ignition OFF is **EV# 4002**.*
    - *Alert message for Ignition OFF is **EV# 6012**.*

- **Command: "+XT:3003,<DCT>"- Sets Direction Change threshold**
  - **Response (via SMS, UDPC):** $$<UID>,<3003>,<DCT>##
    - Where <DCT> is in change threshold in degrees: ≥ 10 degrees, 5 degree increments, 0 = disable, 180 max
    - *Alert message when direction change exceeds threshold is **EV# 6001***

- **Command: " +XT:3004,<SPT>"- Sets Speed threshold**
  - **Response (via SMS, UDPC):** $$<UID>,<3004>,< SPT >##
    - <SPT> is in mph: ≥ 20 mph, 5 mph increments, 0 = disable, 150 max
    - *When speed is above threshold for 15 seconds. The event is reset when speed is 15 mph below the threshold.*
    - *Alert message when speed exceeds threshold is **EV# 6002***

- **Command: " +XT:3005,<RPT>"- Sets RPM threshold**

- **Response (via SMS, UDPC):** $$<UID>,<3005>,<RPT>##
  - <RPT> is in rpm: ≥ 100 rpm, 1rpm increments, 0 = disable, 20000 max
  - *The event is reset when RPM is 500 below the threshold.*
  - *Alert message when RPM exceeds threshold is **EV# 6003***

- **Command: "+XT:3006,<MT>"- Sets Mileage threshold**
  - **Response (via SMS, UDPC):** $$<UID>,<3006>,<MT>##
    - <MT> is miles ≥ 10 miles, 5 mile increments, 0 = disable, 65000 max
    - *An alert is sent on every multiple of the threshold mileage and accumulates to 65000 miles. An alert is sent when the mileage wraps from 65000 to zero miles. A power cycle or reset command will reset the miles to zero.*
    - *Alert message when mileage exceeds threshold is **EV# 6005***

- **Command:"+XT:3007,<AC>,<DC>"- Sets Acceleration/Deceleration thresholds**
  - **Response (via SMS, UDPC):** $$<UID>,<3007>,<ACT>,<DCT>##
    - <AC> is acceleration threshold ≥ 1mph/sec, 1mph increments, 0 = disable, 20 max
    - <DC> is deceleration threshold ≥ 1mph/sec, 1mph increments, 0 = disable, 20 max
    - *Alert messages when acceleration or deceleration exceeds threshold are **EV# 6006 and EV# 6007** respectively.*

- **Command: "+XT:3008,<BT>,<PS>"- Sets Low Battery threshold**
  - **Response (via SMS, UDPC):** $$<UID>,<3008>,<BT>,<PS>##
    - <BT> is main battery voltage threshold (volts): ≥ 6V and ≤ 16V volts, 0.1 volt increments, 0 = disable
    - <PS> is GPS power saving mode, 1= GPS is always ON, 2= GPS OFF when battery voltage is below threshold
    - *If <BT> is set to 0 (disabled), GPS is always ON (independent of <PS>)*
    - *Alerts when voltage is below threshold for 10 minutes and resets when the battery voltage is 0.9V above the threshold.*
    - *Alert message when battery voltage is below threshold is **EV# 6008***

- **Command: "+XT:3010,<PI>,<PA><RVN>"- Sets Heartbeat and Power Up/Reset reporting.**
  - **Response (via SMS, UDPC):** $$<UID>,3010,<PI>,<PA>**##**
    - <PI> is periodic interval in minutes: ≥ 10 minute, 5 minute increments, 0 = disable, 43200 max
    - <PA> is Power Up/Reset and GPS lock alert enable/disable: 0 = disable, 1 = enable.
    - <RVN> is read VIN # once, alert enable/disable: 0= disable, 1= enable
    - *Periodic reporting message for Heartbeat is **EV# 4006** and **EV# 4050***
    - *Alert message for Power Up/Reset and GPS lock is **EV# 6015** and **EV# 4050***
    - Alerts message sent once when with VIN #, EV# 6053

- **Command: "+XT:3013,<IDT>"- Sets Idle alert period**
  - **Response (via SMS, UDPC):** $$<UID>,<3013>,<IDT>##
    - <IDT> is idle time in minutes, ≥ 2 minute, 1 minute increments, 0 = disable, 43200 max
    - *Periodic reporting message for Idle Time Alert is **EV# 6016**.*

- **Command: "+XT:3014,<TW>,<TSTS>,<TSPS>,<TSTT>,<TSPT>"- Sets Tow alert and thresholds**
  - **Response (via SMS, UDPC):** $$<UID>,3014,<TW>,<TSTS>,<TSPS>,<TSTT>,<TSPT>##
    - <TW> is towing alert msg. enable/disable: 0 is disable alert msg, 1 is enable alert msg
    - <TSTS> is towing start speed threshold in mph: ≥ 1 mph, 0= default 20 mph, 150 mph max
    - <TSPS> is towing stop speed threshold in mph: ≥ 1 mph, 0= default 5 mph, [TSTS-3] mph max
    - <TSTT> is towing stat time threshold in seconds: ≥ 1 sec, 0= default 10 sec, 900 sec max
    - <TSPT> is towing stop time threshold in seconds: ≥ 1 sec, 0= default 120 sec, 900 sec max
    - When speed is above the Start Speed threshold for longer than the Start Time threshold, Towing is activated
    - When speed is below the Stop Speed threshold for longer than the Stop Time threshold, Towing is deactivated
    - *Alert message for Tow Alert **is EV# 6017** and Stop Tow is **EV# 6018**.*

- **Command: "+XT:3019,<MS>,<MSTS>,<MSPS>,<MSTT>,<MSPT>"- Sets Movement Start/Stop alert and thresholds**
  Response (via SMS, UDPC): $$<UID>,3019,<MS>,<MSTS>,<MSPS>,<MSTT>,<MSPT>##
    - <MS> = 0 is disable movement alert and <MS> = 1 is enable movement alert
    - <MSTS> is movement start speed threshold in mph: ≥ 1 mph, 0= default 20mph, 150mph max.
    - <MSPS> is movement stop speed threshold in mph: ≥ 1 mph, 0= default 5 mph, [MSTS-3] max

- <MSTT> is movement start time threshold in seconds: ≥ 1 sec, 0= default 10 sec, 900 sec max
- <MSPT> is movement stop time threshold in seconds: ≥ 1 sec, 0=default 120 sec, 900 sec max
- When speed is above the Start Speed threshold for longer than the Start Time threshold, Moving is activated
- When speed is below the Stop Speed threshold for longer than the Stop Time threshold, Moving is deactivated
- *Alert message for Movement Start is **EV# 6030** and Movement Stop is **EV# 6031**.*

- **Command: "+XT:3020,<PT>"- Sets Park Time threshold**
  - **Response (via SMS, UDPC):** $$<UID>,3020,<PT>##
    - <PT> is park time in minutes: ≥ 10 minute, 1 minute increments, 0 = disable, 43200 max
    - *Alert message when Park Time exceeds threshold is **EV# 6032.***

- **Command: "+XT:3024,<SBHyst>,<SB1Begin>,<SB1End>,…<SB5Begin>,<SB5End>"- Sets Speed Bands**
  - **Response (via SMS, UDPC):** $$<UID>,<3024>,<SBHyst>,<SB1Begin>,<SB1End>…<SB5Begin>,<SB5End>##
    - <SBHyst > Speed has to be within the band for x seconds before beginning/ending duration accumulation in a band <SBHyst> 0=disabled, valid >=10 seconds and <=600 seconds (10 min).
    - <SBnBegin> Speed Band n Begin Speed in Mph (>=)
    - <SBnEnd> Speed Band n End Speed in Mph. (<=)
    - Where SBn are non-overlapping increasing values, valid entries are >=0 and <=150
    - Note: If an SBnEnd = 0, then there is no upper limit (also no additional subsequent bands permitted) (e.g. SB3Begin = 90, SB3End = 0 -> any speed >= 90 is in band 3, band 4 and 5 are not enabled)
    - Alert message for Speed Band Duration generated when the vehicle leaves a valid speed band ***EV# 6036***

- **Command: "+XT:3027,<DS>,<DRM>"- Sets Diagnostic Trouble Code Alert**
  - **Response (via SMS, UDPC):** $$<UID>,3027,<DS>,<DRM>##
    - <DS> is DTC setting 0 = disabled, 1 = enabled. *DTC's are monitored when vss <= 10mph every 10 minutes*
    - <DRM> is DTC reminder period. While DTCs are detected periodically send alert, 0 = no reminder, valid >= 1 hour and <= 720 (30 days)
    - Alert message when DTC list has changed or on periodic reminder is **EV# 6045**

- **Command: "+XT:3030,<FT>,<MGT>,<EC>,<MC>"- Sets Configuration for MPG calculations**
  - **Response (via SMS, UDPC):** $$<UID>,3030,<FT>,<MT>,<EC>,<MC>##
    - <FT> is Fuel Type = 0 (default, query OBD), =1 (override gasoline), =2 (override diesel)
    - <MT> is MPG Type = 0 (default, query OBD), =1 (override EFR), =2 (override MAF)
    - <EC> is EFR Coefficient (> 0, <= 10) default = 1.00, 10.00 max
    - <MC> is MAF Coefficient (> 0, <= 10) default = 1.00, 10.00 max

- **Command: "+XT:3040,<ONI>,<ONA>,<OFI>,<OFA>,<DCT>,<SPT>,<RPT>,<MT>,<AC>,<DC>, <BT>,<PS>,<PI>,<PA>,<RVN>,<IDT>,<TW>,<TSTS>,<TSPS>,<TSTT>,<TSPT>,<MS>,<MSTS>,<MSPS>,<MSTT>,<MSPT>,<PT>,<PF>"- Sets commands 3000-3023 series intervals/thresholds**
  - **Response (via SMS):** $$<UID>,<3040>,<ONI>,<ONA>,<OFI>,<OFA>,<DCT>,<SPT>,<RPT>, <MT>,<AC>,<DC>,<BT>,<PS>,<PI>,<PA>,<RVN>,<IDT>,<TW>,<TSTS>,<TSPS>,<TSTT>,<TSPT>,<MS>,<MSTS>,<MSPS>,<MSTT>,<MSPT>,<PT>,<PF>##

- **Command: "+XT:3042,<SBHyst>,<SB1Begin>,<SB1End>,<SB2Begin>,<SB2End>,<SB3Begin>,<SB3End>,<SB4Begin>,<SB4End>,<SB5Begin>,<SB5End>,<DS>,<DRM>,<FT>,<MGT>,<EC>,<MC>,<PF>"- Sets commands 3024-3030 series intervals/thresholds**
  - **Response (via SMS):** $$<UID>,<3042>,<SBHyst>,<SB1Begin>,<SB1End>,<SB2Begin>,<SB2End>,<SB3Begin>,<SB3End>,<SB4Begin>,<SB4End>,<SB5Begin>,<SB5End>,<DS>,<DRM>,<FT>,<MGT>,<EC>,<MC>,<PF>##
    - <PF> Profile configuration is up to 7 alphanumeric characters. <FacDflt> and <Unknown> are unavailable. PF should be the same in the 3040 and 3042

- **Command: "+XT:3050"- Query current interval, alert and threshold settings** (3000-3023)
  - **Response (via SMS):** $$<UID>,<3050>,<ONI>,<ONA>,<OFI>,<OFA>,<DCT>,<SPT>,<RPT>, <MT>,<AC>,<DC>,<BT>,<PS>,<PI>,<PA>,<RVN>,<IDT>,<TW>,<TSTS>,<TSPS>,<TSTT>,<TSPT>,<MS>,<MSTS>,<

MSPS>,<MSTT>,<MSPT>,<PT>,<PF>##

- **Command: "+XT:3052"- Query current interval, alert and threshold settings** 2(3024 - 3030)
  - **Response (via SMS):**
    $$<UID>,<3052>,<SBHyst>,<SB1Begin>,<SB1End>>,<SB2Begin>,<SB2End>,<SB3Begin>,<SB3End>,<SB4Begin>,<SB4End>,<SB5Begin>,<SB5End>,<DS>,<DRM>,<FT>,<MT>,<EC>,<MC>,<PF>##

Server Geofence Commands/Unit Response

- **Command: "+XT:5001,<ID>,<M>,<TLLAT>,<TLLON>,<BRLAT>,<BRLON>" - Adds rectangular geofence to memory**
  - **Response (via SMS, UDPC):** $$<UID>,<5001>,<ID>,<M>,<TLLAT>,<TLLON>,<BRLAT>,<BRLON>##
    - <ID> is 0 to 9 assigned to each geofence- 10 geofences max including 5003 fences
    - <M>=Mode:
      0 indicates disabling the geofence
      1 indicates geofence event when the unit crosses out of the geofence
      2 indicates geofence event when the unit crosses into the geofence
      3 indicates geofence event when the unit crosses in or out of the geofence
    - <TLLAT>,<TLLON>=LAT and LON coordinates (5-digit decimal degrees) for top left corner of geofence
    - <BRLAT>,<BRLON>= LAT and LON coordinates (5-digit decimal degrees) for bottom right corner of geofence
    - *The response includes only 5digit decimal degree resolution*
    - *A power up/reset with GPS lock and a location inside a mode 2 or 3 geofence will result in an alert message*
    - *Alert message when Geofence crossing detected is **EV# 6004***

- **Command: "+XT:5002[,<ID>]"- Delete all Geofences**
  - **Response (via SMS, UDPC):** $$<UID>,<5002>[,<ID>]##
    - *Delete the specified Geofence.*
    - *If the command sent without <ID>, it will delete all the Geofences*
    - *This command will set all geofences to mode 0 and coordinates to 0*

- **Command: "+XT:5003,<ID>,<M>,<LT1>,<LN1>,<LT2>,<LN2>,…<LTn>,<LNn>" - Adds polygon geofence to memory**
  - **Response (via SMS, UDPC):** $$<UID>,<5003>,<ID>,<M>,<LT1>,<LN1>,<LT2>,…<LTn>,<LNn>##
    - <LTn>, <LNn>, LAT and LON coordinates, Enter 3 to 7 geofence coordinates (5-digit decimal degrees resolution max)
    - *10 geofences max including 5001 fences*
    - *Enter 3 to 6 geofence coordinates with 5-digit decimal degrees resolution max*
    - *Enter 7 geofence coordinates with 4-digit decimal degrees resolution max*
    - *The response includes only 4-digit decimal degree resolution*
    - *A power up/reset with GPS lock and a location inside a mode 2 or 3 geofence will result in an alert message*
    - *Alert message when Geofence crossing detected is **EV# 6004***

- **Command: " +XT:5050,<ID>"- Query geofence settings**
  - **Response (via SMS, UDPC):** $$<UID>,<5050>,<ID>,<M>,<LT1>,<LN1>,<LT2>,<LN2>,…<LTn>,<LNn>##
    - *The response includes only 3-digit decimal degree resolution*

Server General Commands/Unit Response

- **Command: "+XT:7001,<X>"- Read and report vehicle position immediately**
  - **Response:** $$<UID>,<7001>,<D>,<T>,<LT>,<LN>,<AL>,<SP>,<AC>,<DC>,<RP>,<HD>,<SV>,<HP>,<GS>,<IG>,<MI>,<MG>,<BV>,<CQ>,<GT>,<FL>[,<SEQ>]##
    - <X> = 1 will respond via UDP/TCP and <X> = 2 will respond via SMS
    - <IG> is ignition status: 0 = OFF, 1 = ON

- **Command: "+XT:7002,<X>"- Read and report vehicle information**
  - **Response:**
    $$<UID>,<7002>,<OB>,<VN>,<MI>,<IG>,<BV>,<MG>,<MGT>,<MGC>,<VIN_SUP>,<FL_SUP>,<FT_SUP>,<MAF_SUP>,<EFR_SUP>[,<SEQ>]##

- <X> = 1 will respond via UDP/TCP and <X> = 2 will respond via SMS
- <OB> is the OBD protocol description
- <VN> is the Vehicle Identification Number
- <IG> is ignition status: 0 = OFF, 1 = ON
- <MGT> is MPG type = 00 (undefined), =17 (Gasoline, EFR), =18 (Gasoline, MAF), = 33 (Diesel, EFR), = 34 (Diesel, MAF)
- <MGC> is MPG Coefficient used in calculating <MG>.
- <VIN_SUP>,<FL_SUP>,<FT_SUP>,<MAF_SUP>,<EFR_SUP> are the PIDs provided by the vehicle. 0= not supported, 1= supported

- **Command**: **"+XT:7003" – This will reset the entire modem and revert back to all NV parameters**
  - **Response (via SMS, UDPC)**: $$<UID>,<7003>##

- **Command**: **"+XT:7004" – Erase all data and configuration settings and reload saved profile**
  - **Response (via SMS, UDPC)**: $$<UID>,7004,<PF>##
    - *Erases its event logs, 5000 and 7000 settings and sets 1000 and 3000 series configurations to profile in saved memory*
    - *If no profile was saved to memory (Ref 7008), the profile is set to factory defaults and the device responds with FacDflt*

- **Command: "+XT:7006,<VO>"- Initialize/set Virtual Odometer**
  - **Response (via SMS, UDPC):** $$<UID>,7006,<VO>##
    - <VO> is virtual odometer value from 0 to 65,000 miles in increments of 1
    - *Virtual odometer is reset to zero on a power cycle, reset or memory erase*

- **Command**: **"+XT:7007" – Reset the GPS**
  - **Response (via SMS, UDPC)**: $$<UID>,<7007>##
    - *Applicable to GPS type ≥2 devices only (reference +XT:1007)*

- **Command**: **"+XT:7008" – Save Profile to memory**
  - **Response (via SMS, UDPC)**: $$<UID>,7008,<PF>##
    - *Saves current 1003, 1005, 3050 settings to memory*
    - *If <PF> Profile name (created in 3040 and queried in 3050 cmd) is Unknown or FacDflt, the profile will not save to memory and the device will respond with XT_ERROR*

- **Command**: **"+XT:7009" – Clear Profile from Memory**
  - **Response (via SMS, UDPC)**: $$<UID>,7009,<*Cleared*>##

- **Command**: **"+XT:7010" – Read Profile name saved in memory**
  - **Response (via SMS, UDPC)**: $$<UID>,7010,<PF>##
    - *If no profile was saved to memory, the device responds with "Cleared"*

- **Command: "+XT:7016,<X>"- query to read DTC status**
  - **Response (via SMS, UDPC):** $$<UID>,7016,<D>,<T>,<LT>,<LN>,<AL>, <SV>,<HP>,<GS>,<GT>,<MilStatus>,<DTC Count>,<DTC_Code_1> … <DTC_Code_n>[,<SEQ>]##
    - <X> = 1 will respond via UDP/TCP and <X> = 2 will respond via SMS
    - The GPS time in the 7016 message is the time when the DTC occurred.
    - To receive a valid 7016 response, the 3027 must be enabled.

- **Command**: **"+XT:7050,<X>"- Query diagnostics**
  - **Response (via SMS, UDPC):** $$<UID>,7050,<GSM>,<GPR>,<PDP>,<HOFF>,<HON>,<PU>,<R>,<%GPS>,<%GPSQ>, <%GSM>,<%GPR>,<%PDP>,<LV>,<HV>,<CX>,<DBO>,<ABI>,<DBI>,<SO>,<SI>,<SS>##
    - <X>=1 is query without clear and <X>=2 is query and then clear all values
    - <GSM> is GSM registration state: 0=Not Reg, 1=Home, 2=Search, 3=Denied, 4=Unknown, 5=Roaming
    - <GPR> is GPRS registration state: 0=Not Reg, 1=Home, 2=Search, 3=Denied, 4=Unknown, 5=Roaming
    - <PDP> is GPRS PDP state, 0=Deactivated, 1=Activated
    - <HOFF> is Hours Disconnected counter, 1000 max
    - <HON> is Hours ON counter, 1000 max

- <PU> is Power Up counter, 255 max
- <R> is Reset counter,255 max
- <%GPS> is Percent lost GPS
- <%GPSQ> is Percent lost GPS based on 5 Sat Quality Factor
- <%GSM> is Percent lost GSM
- <%GPR> is Percent lost GPRS
- <%PDP> is Percent lost PDP context activation
- <LV> is Low Voltage counter, # sec < 9 Volts, 60000 max
- <HV> is High Voltage counter, # sec > 16 Volts 60000 max
- <CX> is Context activation counter, 1000 max
- <DBO> is Data Bytes Out, 10000000 max
- <ABI> is ACK Bytes In, 10000000 max
- <DBI> is DOTA Bytes In, 10000000 max
- <SO> is SMS Msg Out counter, 1000 max
- <SI> is SMS Msg In counter, 1000 max
- <SS> is SMS Spam Msg In counter, 1000 max
- *Counter and Percent values are accumulated since last clear*

XIRGO TECHNOLOGIES

Appendix 1 UDPwAck Description

The UDPwAck feature provides an application layer acknowledgement/resend protocol for UDP messaging. This mode is selected via SMS network commands (1001, 1010) with TCP/UDP field entry of '3'. The previous UDP mode (field value of "2") is unchanged and does not utilize ack responses from the server.

Operation:

The UDPwAck consists of two progressive timing backoffs:

UDP ack timeouts: 15 sec, 30 sec

UDP hold-off intervals: 2 min, 4 min, 8 min, 16 min, 32 min, 1hour

The UDP ack timeouts indicate how long the device will listen for the appropriate ack from the server after a UDP message is sent. The UDP hold-off intervals indicate how long the device will wait before allowing the re-transmission of pending UDP messages. Note that the device does not receive any acks sent by the server during the UDP hold-off period, it only listens during the ack timeout periods.

In normal operation, the device will save an event occurrence (6xxx alert msg, 4xxx periodic msg or 7001/5 cmd responses), send a UDP message to the server and wait for the appropriate ack back from the server.

No Ack Received:

If no ack is received with proper syntax within the 15 sec timeout, the same message will be resent with a 30 sec timeout. If the ack fails after the 30 sec timeout, the device starts a UDP hold-off period before repeating the above two message send/listen process. The UDP hold-off interval starts at 2 min and increases up to a maximum of 1 hour (repeating 1 hour thereafter) on each unsuccessful re-transmission attempt (2 messages each). Any new events that occur during the hold-off period will be saved to memory but will not trigger a new transmission. Re-transmission attempts (oldest to newest) will remain based on the hold-off period until a successful ack response is received during a re-transmission period. The oldest events are discarded when the message buffer is full.

Ack Received:

If a proper ack is received during the UDP transmission attempts, the device will remove the event from memory and send the next event saved, restarting with 15 sec ack timeout. This will repeat until all stored events are sent with proper ack responses. The UDP hold-off will be disabled and any new event occurrence will attempt transmission as it occurs. If during the memory cycling (one at a time tx msg, rx ack, clear msg and repeat on next msg) transmissions an event fails the two transmission attempt, that event is not removed from memory and the UDP hold-off will re-start at 2 min. The previous successfully ACKed events are cleared from memory and the next retransmission attempt will start with the failed message.

Additional Notes:

- The sequence number only increments after a successful ack response from the server.
  The seq number resets to 000:
  - Wrap after 255 reached
  - Pwr-up/reset of device
  - The device sends at least one message via TCP or UDP (w/o ack)

  The sequence number is not unique to the event number.
- 7001,1 and 7005,x,1 command responses also have the seq number field added and use ack process defined above even though these are user initiated responses rather than device initiated alert/periodic reports. Unlike the alert/periodic reports, receipt of these commands will force a reset of the UDP hold-off period which allows the server to restart pending transmissions immediately. The re-transmission still starts with oldest saved record and the 7001, 7005 responses are saved with the other event messages as received.
- Sending the 7001,2 or 7005,x,2 SMS cmds for SMS replies does not affect the UDP hold-off and SMS responses are sent upon receipt of the message.
- The device will take no action on a received UDP ACK when configured for TCP or UDP(w/o ack) mode.
- At device power-up or after 7003 reset cmd, the device will reset the SEQ number to 000 and will reset (disable) the UDP hold-off thus permitting immediate transmit attempt of any previously stored msgs. A 7004 erase memory cmd (clears all messages in memory) does not reset the SEQ number to 000 but it does reset (disable) the UDP hold-off since no messages are no longer pending.
- The device listens on the same port as the one used to transmit.
- UDPwACK (TU=3) messages from the device to the server must be ACKed by the server.

Notes**:**

- The unit only responds to commands starting with "+XT:"
- The unit responds to any commands it does not understand or does not allow with $$<UID>,<CMD>,"XT_ERROR".
- Server commands are sent via SMS or UDPwCmd and responses are SMS or TCP/UDP based, as indicated
- All periodic reporting and alert messages are TCP/UDP based.

Event Number Summary		Server Initiated SMS Command Summary
Periodic Reporting		**Configuration**
4001- Periodic reporting with ignition ON		1001- Set server TCP IP address and port
4002- Periodic reporting with ignition OFF		1002- Set APN configuration
4006- Periodic reporting with power up (heartbeat)		1003- Query TCP/APN settings
4050- Diagnostic data with heartbeat/power up reporting		1004- Set FTP configuration
		1005- Query FTP settings
		1006- Update FW
Alert Messages		1007- Query FW versions
6001- Direction Change threshold exceeded		1008- Sets server SMS number
6002- Speed threshold exceeded		1010- Sets 1001, 1002,1008, 1011 and 1013 combination
6003- RPM threshold exceeded		1011- Set server TCP or UDP and PDP refresh
6004- Geofence crossing detected		1012- Sets PDP Refresh timeout
6005- Mileage threshold exceeded		1013- Sets DNS caching and interval
6006- Acceleration threshold exceeded		
6007- Deceleration threshold exceeded		**Interval/Threshold**
6008- Main Battery voltage below threshold		3001- Set ignition ON reporting interval and alert
6011- Ignition ON alert		3002- Set ignition OFF interval and alert
6012- Ignition OFF alert		3003- Set change of direction (degrees) threshold
6015- Alert on initial Power Up/Reset and GPS lock		3004- Set speed threshold
6016- Idle Time threshold alert		3005- Set RPM threshold
6017- Tow detected		3006- Set mileage threshold
6018- Tow has stopped		3007- Set acceleration, deceleration thresholds
6030- Movement Start detected		3008- Sets low battery threshold value
6031- Movement Stop detected		3010- Sets power up and heartbeat reporting
6032- Park Time threshold exceeded		3013- Sets idle time period
6036 – Speed Band alert		3014- Sets tow alert enable/disable
6045 – Diagnostic trouble code list change alert		3026 – Sets speed band alert
6053- Alert message on VIN and GPS lock		3027 – Sets diagnostic trouble code alerts
		3030 – Sets MPG configuration
		3040- Sets all 3000-3023 series intervals and thresholds
		3042 – Sets 3024-3030 series intervals and thresholds
		3050- Query interval and threshold settings (3000-3023)
		3052- Query interval and threshold settings (3024-3030)
OBD Protocol Description:		**Geofence:**
0001 or 0002: ISO		5001- Add rectangular geofence
0004 or 0008: KWP2000		5002- Delete geofences
0010: J1850 PWM		5003- Add polygon geofence
0020: J1850 VPW		5050- Query geofence settings
0040 or 0080 or 0100 or 0200: CAN		**General:**
		7001- Read current GPS position
		7002- Read current vehicle OBD information
		7003- RESET modem
		7004- Erase NVM
		7006- Set virtual odometer
		7007- Reset GPS
		7008- Save profile to memory
		7009- Clear profile from memory
		7010- Read profile name in memory

		7050- Query diagnostics