EL-FAR Electronics systems 2000 Ltd.

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EL-FAR Electronics Systems 2000 Ltd.
Advanced Perimeter Security Solutions

INSITE Command & Control Management Software API v2.2

General

The following document aims to provide a comprehensive technical description of the INSITE software protocol API (Application Programming Interface) to enable integration with 3rd party platforms.

The INSITE, EL-FAR's proprietary Command & Control (C&C) Management Software Application, filters, analyzes and transmits all alert data from EL-FAR's deployed Perimeter Intrusion Detection System (PIDS) to the client's centralized Command & Control Management System (CCMS). This verified alert data is then forwarded to the operator in different methods for further action.

Contents

Table of Figures

Version Updates:

Date	Change	Description	Relevant Articles
25/02/2015	Add "ack" Messages	For every command the system sends an ack type message to confirm the command (acknowledge)	2.5.9 2.6

Chapter 1 - General Description

1.1. System Components

EL-FAR's novel Perimeter Intrusion Detection System (PIDS) includes the following hardware & software components:

1. Main Controller (Control Unit)
2. Fence Controller
3. Dry Contacts Unit
4. C&C Software - proprietary EL-FAR software for PIDS Management

NOTE: According to system design, each controller may serve as several different controllers. This has no implications on protocol functionality, unless clearly mentioned otherwise in this document.

Figure 1: System Architecture Overview – for illustration purposes only

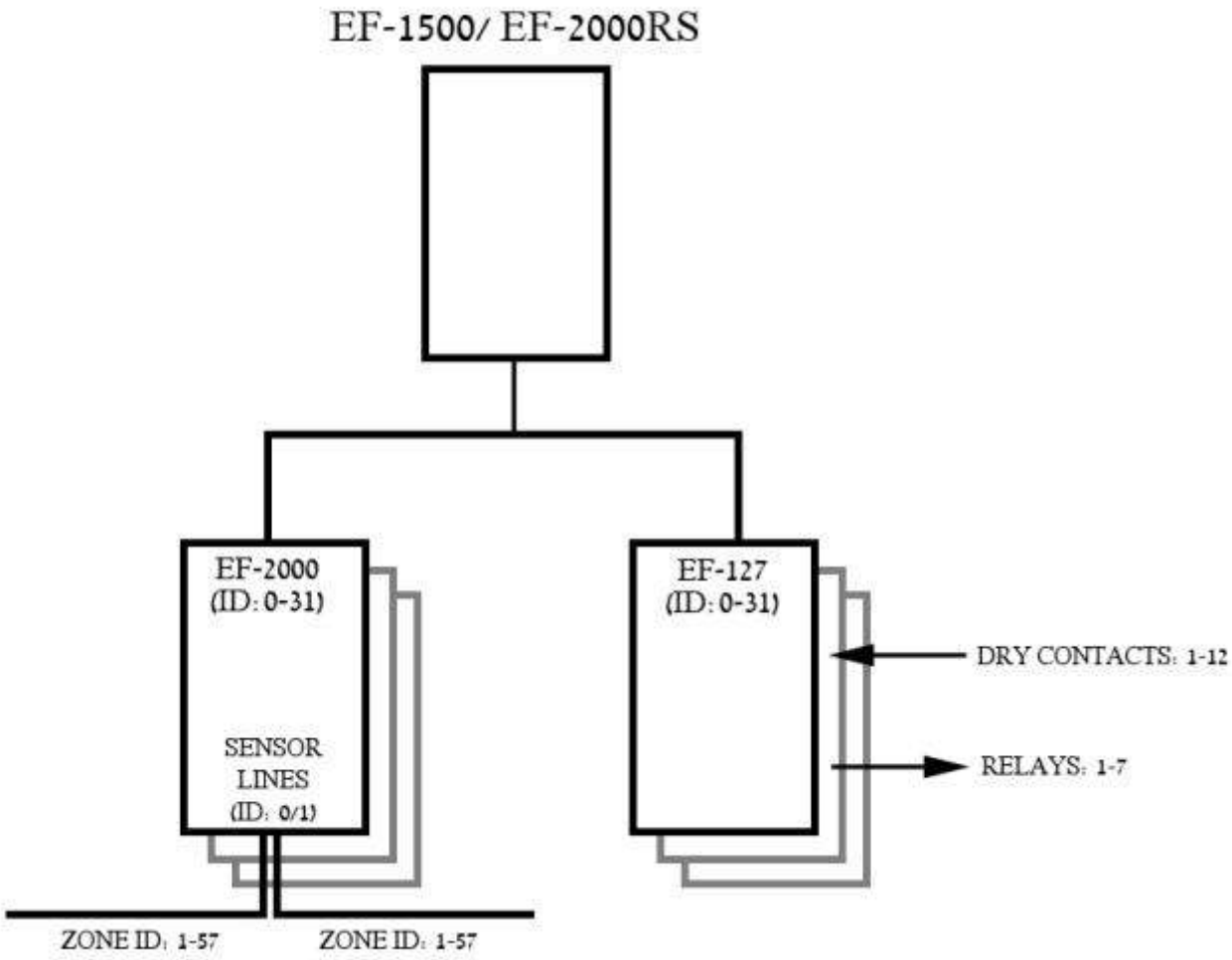
1.2. Controller Functionality

Controller Type	Model	Functionality
Main Controller	EF-1500 EF-2000RS	1. Vitality check of the Field Controllers 2. Communication with the main system PC 3. Communication with the Field Controllers
Fence Controller	EF-2000	1. Internal vitality check 2. Tamper status check 3. Status check of the sensor lines connected to it
Dry Contacts Unit	EF-127	1. Status check of the dry contacts connected to it 2. Relay activation

1.3. General System Structure

Controller Type	Model	Configuration
Main Controller	EF-1500 EF-2000RS	• Controls up to 32 different units (Fence Controllers or Dry Contact Units in various combinations)
Field Controller	EF-2000	• Holds a unique address (0-31) • Can connect up to 2 sensor lines • Each sensor line can hold up to 57 different detection zones
Dry Contacts Unit	EF-127	• Holds a unique address (0-31) • Can connect up to 12 Inputs • Can connect up to 7 Outputs

Figure 2: System Architecture Block Diagram – for illustration purposes only



Chapter 2 – INSITE Software Protocol

2.1. System Elements

The INSITE C&C Management Software (CCMS) receives all the alert data directly from the Main Controller and translates it to messages representing the various statuses of each element type in the system:

System Element	Description
Controller	A control unit which monitors and reports on different elements connected to it
Sensor	A physical element with detection capabilities
Sensor Line	A group of sensors connected serially. A single sensor line can hold up to 57 different zones
Zone	A logic segment of sensors in the sensor line. Also referred to as an Alarm Zone or Detection Zone. Size of the zone is determined according to configured detection resolution and deployment & installation characteristics
Fence Controller	A control unit which monitors and reports on up to 2 sensor lines connected to it
Dry Contact	A hardware element with 3 statuses: 1. Open 2. Closed 3. Short
Relay	A hardware element with 2 statuses: 1. On 2. Off
Dry Contact Unit	A control unit which monitors and reports on up to 12 dry contacts (Inputs) and 7 relays (Outputs)
Object	A general name for any element in the system (Hardware or Software) that can be identified and reported on
Element Status	For each object in the system there can be 3 different status types: 1. Alarm 2. Normal 3. Fail

2.2. Protocol Description

2.2.1. Type

Burst Transmission Mode - Whenever there is a change in the status of any element in the system, the system informs the online clients of the new status. This is done automatically with no need in polling from the client's part.

The protocol is Bi-directional and supports both sending data and receiving various commands.

2.2.2. Communication Infrastructure

The protocol is TCP based communication protocol. The system opens a TCP "LISTENER" on a pre-defined port (can be changed according to needs) and send its statuses to all online clients (More than one).

2.2.3. Message Structure

The Message is an "ASCII STRING" which is constructed from several fields separated by a comma (,). The basic message structure contains information on the alerted object and its status. The message may contain additional information such as: Location, Description, etc. according to the pre-defined settings.

2.3. Types of Supported Outgoing Messages

Controlling Element	Message	Description
System (Software)	Communication to Main Controller	This informs the operator on the current status of communication between the system and the main controller.
	Sensor Lines Check	This check which can be conducted either manually or automatically is meant to check the fence controller's capability to invoke fence alerts. The check results are then presented separately for each of the sensor lines.
	Weather Mode	The system is automatically decides on sensitivity changes in accordance to different check process that it runs.
	System Reset	The System Reset message is sent: 1) On system startup 2) When the system detects communication problems that were restored (in cases of unstable communication, etc.'. - e.g.) After sending the System Reset message: 1) All open outputs are closed. 2) The system will republish all open inputs.
	Vitality Check (KEEP ALIVE)	As a response to the keep alive query (ST, N,1,N,N,N), the system issues a message containing information on the system - main controller communication status.

	'Request for Active Messages' termination.	This message shall appear at the end of issuing Active messages, initiated by the 'Request for Republish of Active Alerts' command (ST,N,2,N,N,N).
Main Controller	Communication status with the main controller or the dry contact unit.	The main controller query all fence controllers constantly and reports in case of communication failure.
Fence Controller	Controller voltage level	This message informs the operator on the fence controller voltage level status.
	Controller box open/close	This message informs the operator on the controller box tamper switch status.
	Fence status	In accordance to the received indications from the fence controller. The system generates status messages for the different fence zone.
Dry Contacts Unit (I/O)	Dry contacts status	When a dry contact changes its status (Open/Close/Short), the system shall report the new status of the relevant element.
	Relay status	This message is received after the system gets a command to open a relay (turn ON). If the command was executed properly, the system shall issue the new status of the relay.
General	Acknowledge	Send confirmation message (ack) once receives a command (acknowledge)

2.4. Types of Supported Commands

Command	Parameters	Description
Open Relay	1. Relay status 2. Identify Unit 3. Identify Relay	The system receives a command to Open or Close a relay (ON/OFF).
Vitality check (KEEP ALIVE)	None	Self-check to see proper operation of the fence controllers.
Request for Republish of Active Alerts	None	Once receiving this command the system shall issue messages with the status of all the alerting elements (Status of 'Alarm' or 'Fail')
Request for Republish of Disable objects	None	Once receiving this command the system shall issue messages with the status of all the disabled elements (also partially disabled)
Sensor Lines Check	None	Once receiving this command the system shall check the sensor lines of all defined fence controllers.
Disable	1. Identify Object Type 2. Identify Status 3. Identify Unit 4. Identify Line 5. Identify Object	Preventing the system to issue messages regarding the disabled element (under 'Disable' it is possible to disable only part of the statuses. The result is referred as 'Part Enable'.
Enable	1. Identify Object Type 2. Identify Status 3. Identify Unit 4. Identify Line 5. Identify Object	Allowing the system to issue messages regarding the enabled element (under 'Enable' it is possible to enable only part of the statuses. The result is referred as 'Part Enable'.

2.5. Outgoing Messages

2.5.1. Outgoing Message structure

The Message is constructed from several fields separated by a comma (,).

Field	Description	Mandatory (must appear)
Type	Type of outgoing message	Yes
Status	Message Status	Yes
Object ID	Identify Object	Yes
Line	Identify Line	Yes
Unit	Identify Unit	Yes
More info	Additional Information (If exist, according to definitions)	No

For Example: <Type>,<Status>,<Object ID>,<Line>,<Unit>,[<More info>]

2.5.2. Type of outgoing messages

- Fence
- Dry contacts
- Relays
- System Messages

2.5.3. Outgoing message structure for Fence

Field	Range of Values	Description
Type	FE	Fence Message
Status	A	Alert
	F	Fail
	N	Normal
Object ID	1 to 57	The zone ID in the sensor line. (1: first zone. 57: last zone.)
Line	0/1	Sensor Line ID in the fence controller
Unit	0 to 31	Unit ID
More info	Please see "Additional Information" Annex	In accordance to definitions

Example 1: FE,A,1,0,1
Fence Message: Alert Status, Zone 1, Line 0, Unit 1

Example 2: FE,N,2,0,1
Fence Message: Normal Status, Zone 2, Line 0, Unit 1

2.5.4. Outgoing message structure for Dry Contacts (Inputs)

Field	Range of Values	Description
Type	IN	Dry Contact Message
Status	A	Open
	F	Fail
	N	Close
Object ID	1 to 12	The input ID in the dry contact unit.
Line	N	Value not relevant for dry contacts messages
Unit	0 to 31	Unit ID
More info	Please see "Additional Information" Annex	In accordance to definitions

Example 1: **IN,A,1,N,1**
Dry Contact Message: Alert Status, Input 1, Unit 1

Example 2: **IN,N,2,N,1**
Dry Contact Message: Normal Status, Input 2, Unit 1

2.5.5. Outgoing message structure for Relays (Outputs)

Field	Range of Values	Description
Type	OU	Relay Message
Status	A	On
	N	Off
Object ID	1 to 7	The output ID in the dry contact unit.
Line	N	Value not relevant for relays messages
Unit	0 to 31	Unit ID
More info	Please see "Additional Information" Annex	In accordance to definitions

Example 1: OU,A,2,N,4
Relay Message: On, Output 2, Unit 4

Example 2: OU,N,7,N,1
Relay Message: Off, Output 7, Unit 1

2.5.6. Outgoing message structure for System Messages

Field	Range of Values	Description
Type	MSG	System Message
Status	A	Alert
	N	Normal
Object ID	1	Controller voltage level
	2	Sensor Line Check
	3	Communication with Fence Controller / Dry Contact unit
	4	Communication with Main Controller
	5	Tamper Sensor
	6	Weather Mode
	7	Keep Alive
	8	System Reset
	9	'Request for Active Messages' termination. (That was initiated by the (ST,N,2,N,N,N) command. - Not including Disable Messages)
Line	N	This Value is relevant to all system messages not including 'sensor line check' message.
	0	Line "0" - Only relevant for 'sensor line check' message.
	1	Line "1" - Only relevant for 'sensor line check' message.
Unit	0 to 31	Identify Unit Relevant for: 'Voltage Level', 'Sensor Line Check', 'Communication with Fence Controller / Dry Contact unit', 'Tamper Sensor'
	N	Relevant for: 'Communication with Main Controller', 'Weather Mode', 'Keep Alive', 'System Reset', '"Request for Active Messages' termination"
More info	Please see "Additional Information" Annex	In accordance to definitions

Example 1: MSG,A,1,N,2
System Message: Fail, Controller voltage level, Unit 2

Example 2: MSG,A,2,0,1
System Message: Fail, Sensor Line Check, Line 0, Unit 1

Example 3: MSG,A,3,N,2
System Message: Normal, Communication with Fence Controller, Unit 2

Example 4: MSG,A,4,N,N
System Message: Fail, Communication with Main Controller

Example 5: MSG,N,5,N,1
System Message: Normal, Tamper Sensor, Unit 1

Example 6: MSG,N,6,N,N
System Message: Normal, Weather Mode

Example 7: MSG,N,7,N,N
System Message: Normal, Keep Alive

Example 8: MSG,A,7,N,N
System Message: Fail, No Communication with Main Controller, Keep Alive

Example 9: MSG,N,8,N,N
System Message: System Reset

Example 10: MSG,N,9,N,N
System Message: Republish of Active Alerts was terminated. (This message is only relevant for Republish of Active Alerts that was initiated by the (ST,N,2,N,N,N) command.)

2.5.7. Outgoing message structure for Disable (Fully/Partially)

Field	Range of Values	Description
Type	DIS	Disable Message
Status	N	Part enable
	A	Fully Disabled
Object ID	1 to 57	The number of the disabled object.
Line	N	Value not relevant. (for disabling dry contacts)
	0	Line "0" (for disabling fence zone)
	1	Line "1" (for disabling fence zone)
Unit	0 to 31	Identify Unit
More info	Please see "Additional Information" Annex	In accordance to definitions

Example 1: DIS,N,1,0,0
Disable Message: Part enable, Zone 1, Line 0, Unit 0

Example 2: DIS,A,4,N,1
Disable Message: Full disable, Zone 4, Line 1

2.5.8. Outgoing message structure for Enable (Fully)

Field	Range of Values	Description
Type	ENA	Enable Message
	N	Fully Enabled
Object ID	1 to 57	The number of the Enabled object.
Line	N	Value not relevant. (for enabling dry contacts)
	0	Line "0" (for enabling fence zone)
	1	Line "1" (for enabling fence zone)
Unit	0 to 31	Identify Unit
More info	Please see "Additional Information" Annex	In accordance to definitions

Example 1: ENA,N,1,0,0
Enable Message: Fully Enabled, Zone 1, Line 0, Unit 0

2.5.9. Outgoing message structure for ACKNOWLEDGE

Note: ACK message is received only as a result of a command to execute (see the following table)

Field	Range of Values	Description
Type	ACK	Enable Message
	N	Constant
Object ID	1 to 57	Matches the same field in the received command
Line	N,0,1	Matches the same field in the received command
Unit	0 to 31, N	Matches the same field in the received command
More info	Please see "Additional Information" Annex	In accordance to definitions

Example 1: (After sending DIS,N,1,0,0,FE (disable zone ,1 line 0, unit 0, type fence))

ACK,N,1,0,0
Acknowledge for command for, Zone 1, Line 0, Unit 0

2.6. Incoming Messages (Commands)

2.6.1. Basic Definitions

2.6.1.1. An Incoming message is a command sent by the user to the C&C software.
2.6.1.2. An Incoming message consists with an ascii string, and contains several fields (according to definition) that are separated by comma (,).
2.6.1.3. An Incoming message must begin with STX (ascii: 2) characters and end with ETX (ascii: 3) characters.
2.6.1.4. The command's result shall be issued to all online users. (e.g.: a reply for Keep Alive shall be issued to all online users and not only to the user who initially sent it).
2.6.1.5. Once specific commands are received the system sends a confirmation message (ACK, article 2.5.9)

2.6.2. Incoming Message structure

Field	Description	Mandatory
STX	Beginning of the Message	Yes
Type	Type of Incoming message	Yes
Status	Message Status	Yes
Object ID	Identify Object	Yes
Line	Identify Line	Yes
Unit	Identify Unit	Yes
More Info	Additional Information	Yes
ETX	End of Message	Yes

Example: STX<Type>,<Status>,<Object ID>,<Line>,<Unit>,<More info>ETX

2.6.3. Type of Incoming messages

- Relays
- Status action
- Disable
- Enable

The following table describes system response to received commands (before, during and after execution):

Command	Response before execution	Response during execution	Response after execution	Reasons for no execution	Response in case of no execution
Relays	None	Relay Status	None	Driver not connected to the Controller	None
				Command consisting of abnormal data	None
				Command to activate an activated relay or deactivate a deactivated relay	Status of existing relay
ST,N,1,N,N,N (keep alive)	None	KEEP ALIVE type message	None		
ST,N,2,N,N,N (Request alarms)	None	List of active alarms (if triggered)	MSG,N,9,N,N		
ST,N,3,N,N,N (sensor line check)	None	Sensor Line Fail Message (if registered)	MSG,N,8,N,N (reset MSG)	Wrong system settings	Sensor Line Fail Message
ST,N,5,N,N,N (request disable)	ACK Type message	List of neutralized objects (if triggered)	None		
ST,N,6,N,N,N (enable system)	ACK Type message	List of armed objects (if triggered)	None		
Disable	ACK Type message	DIS Type message	None	Object does not exist	None
Enable	ACK Type message	ENA Type message	None	Object does not exist	None

2.6.4. Incoming message structure for Relays (Outputs)

Field	Range of Values	Description
Type	OU	Relay Message
Status	ON	On
	OFF	Off
Object ID	1 to 7	The output ID in the dry contact unit.
Line	N	Value not relevant for relays messages
Unit	0 to 31	Identify Unit
More info	Duration (In seconds)	The time duration for a relay to Turn Off automatically. (only relevant for Turn On command)
	N	Relay is Turned On with no time limitation

Example 1: <STX>OU,ON,1,N,4,N<ETX>
Relay Message: On, Output 1, Unit 4, No time limitation

Example 2: <STX>OU,ON,1,N,4,30<ETX>
Relay Message: On, Output 1, Unit 4, 30 seconds duration

Example 3: <STX>OU,OFF,3,N,5,N<ETX>
Relay Message: Off, Output 3, Unit 4

2.6.5. Incoming message structure for Status Check

Field	Range of Values	Description
Type	ST	Relay Message
Status	N	On
Object ID	1	Keep Alive Status Check
	2	Request for Republish of Active Alerts
	3	Sensor Line Check
	4	Sensitivity Check (INACTIVE)
	5	Request for Republish of Disabled Objects
	6	Enable System (Enables all Disabled Objects)
Line	N	Value not relevant for Status check
Unit	N	Value not relevant for Status check
More info	N	Value not relevant for Status check

Example 1: <STX>ST,N,1,N,N,N<ETX>
Status Check Message: Keep Alive Check
Remark: in Normal status, the response shall be in a Keep Alive type, system message (MSG,N,7,N,N).

Example 2: <STX>ST,N,2,N,N,N<ETX>
Status Check Message: Request for Republish of Active Alerts
Remark: if an active alert exists, the system shall issue it as described under Outgoing Messages clause. Once the system shall finish issuing the messages, a "'Republish of Active Alerts' Termination" message shall be received (MSG,N,9,N,N).

Example 3: <STX>ST,N,3,N,N,N<ETX>
Status Check Message: Sensor Line Check Activation
Remark: At the end of this check, a 'Sensor line check' type messages shall be issued on all relevant lines that failed the test. (MSG,A,2,0,1
System Message: Fail, Sensor Line Check, Line 0, Unit 1 - e.g.).

Example 4: <STX>ST,N,5,N,N,N<ETX>
Status Check Message: Request for Republish of Disabled Objects
Remark: if a disabled object exists, the system shall issue it as described under Outgoing Messages clause.

Example 5: <STX>ST,N,6,N,N,N<ETX>
Status Check Message: Enable System
Remark: The system shall enable all disabled objects.

2.6.6. Incoming message structure for Disable

Field	Range of Values	Description
Type	DIS	Disable Message
Status	A	Disabled Alert Status
	F	Disabled Fail Status
	N	Fully Disabled
Object ID	1 to 57	The number of the disabled object.
Line	N	Value for disabling a dry contacts input
	0	Line "0" (for disabling fence zone)
	1	Line "1" (for disabling fence zone)
Unit	0 to 31	Identify Unit
More info	FE	Disable fence zone
	IN	Disable dry contact input

Example 1: <STX>DIS,A,1,N,4,IN<ETX>
Disable Message: Disabled Alert Status, Object 1, Unit 4, Type: Dry Contact input

Example 2: <STX>DIS,F,3,1,5,FE<ETX>
Disable Message: Disabled Fail Status, Object 3, Line 1, Unit 5, Type: Fence zone.

2.6.7. Incoming message structure for Enable

Field	Range of Values	Description
Type	ENA	Enable Message
	A	Enabled Alert Status
Status	F	Enabled Fail Status
	N	Fully Enabled
Object ID	1 to 57	The number of the Enabled object.
Line	N	Value relevant for enabling dry contacts
	0	Line "0" (for enabling fence zone)
	1	Line "1" (for enabling fence zone)
Unit	0 to 31	Identify Unit
More info	FE	Enable fence zone
	IN	Enable dry contact input

Example 1: <STX>ENA,A,1,N,4,IN<ETX>
Enable Message: Enabled Alert Status, Object 1, Unit 0, Type: Dry Contact input

Example 2: <STX>ENA,A,1,N,4,IN<ETX>
Enable Message: Enabled Fail Status, Object 3, Line 1, Unit 5, Type: Fence zone.

Annex I - Additional Information

The system allows the user to define that an outgoing message shall contain "More Info" as an additional field. The information under this field shall contain general information regarding the alert according to pre-determined characteristics.

The "More Info" field shall appear in following structure:

<KEY:VALUE>

When

KEY: Field Characteristic
VALUE: Field Value

The KEY and the VALUE shall be separated by a colon (:).
Multiple fields shall be separated by a semicolon (;).

For Example:

FE,A,23,0,3,DESCRIPTION:ZONE 1
Fence Message: Alert Status, Zone 23, Line 0, Unit 3,

More Info:
Value for description is Zone 1

For Example:

FE,A,23,0,3,DESCRIPTION:ZONE 1;X:11111;Y:22222
Fence Message: Alert Status, Zone 23, Line 0, Unit 3,

More Info:
Value for description is Zone 1
Value for X is 11111
Value for Y is 22222