

# Add an AT Command

This chapter describes SRV\_AT's constant arrays, and presents examples that explain how to add new AT commands to SRV\_AT.

General procedure to add AT commands:

1. Examine the types of commands and the responses that each command generates (solicited responses). Determine if responses can also be generated not as a direct result of a command (unsolicited responses).
2. Differentiate between the responses to see how SRV\_AT can parse and interpret them.
3. Enter the rules and responses into two of SRV\_AT's constant arrays.

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## SRV\_AT's Constant Arrays

SRV\_AT contains two internal constant arrays that contain all the information about identifying the responses.

These arrays always hold the same number of records; the data at a given index in the one array corresponds to the data at the same index in the other array.

### ANSWER\_TABLE\_INT\_CArY

The ANSWER\_TABLE\_INT\_CArY integer array contains the rules for identifying the responses, as described in the following table:

<b>BITS</b>	<b>DESCRIPTION</b>
0-3	Empty.
4-6	If 0, no need to count commas. Otherwise, a value from ALL_COMMANDS_CHECKING_CS indicates in which table to count the commas.
7-11	Length of the response string in ANSWER_TABLE_STR_CArY.
12-19	Type of response, from ANSWER_KIND_CS. Recommended values: <ul style="list-style-type: none"><li>• 0 (solicited) or any other value except for 4 and 128</li><li>• 4 (unsolicited)</li><li>• 128 (two lines)</li></ul>

### ANSWER\_TABLE\_STR\_CArY

The ANSWER\_TABLE\_STR\_CArY string array holds the response strings themselves.

**Examples**

- +CSQ: (
- +CREG:
- OK

**Note:** You only need to add new responses.

**Example: Add the +CSQ Command**

This is a simple example. It shows how to add two kinds of responses.

**Step 1: Examine the Types of Commands and Their Responses**

The new +CSQ command can have the following formats and responses:

Set command: AT+CSQ  
 Solicited response: +CSQ: <rssI>,<ber>

Query command: AT+CSQ=?  
 Solicited response: +CSQ: (list of supported <rssI>s), (list of supported <ber>s)

**Step 2: Interpret Responses**

SRV\_AT must differentiate between the different kinds of responses:

COMMAND	RESPONSE	INTERPRETATION
Set	+CSQ:	Has no parenthesis
Query	+CSQ: (	Identifiable by the left parenthesis

Therefore, SRV\_AT must parse the response string, searching for a left parenthesis.

**Step 3: Enter the Rules into the Constant Arrays**

Check if each type of response appears in the array. If not, enter it.

➔ **Add the +CSQ: response:**

1. Add a new element to both arrays.
2. In ANSWER\_TABLE\_STR\_CArY, add a value to the new element: "+CSQ:".
3. In ANSWER\_TABLE\_INT\_CArY, enter the integer for the corresponding new element, calculated as shown in the table below. The value in this case is 1280.

BITS	DECIMAL VALUES	BINARY VALUES	EXPLANATION
0-3	0	0000	Empty
4-6	0	000	No need to count commas

BITS	DECIMAL VALUES	BINARY VALUES	EXPLANATION
7-11	5	00101	Length of response string
12-19	0	00000000	None
Result	1280	00000000010100000000	

➔ **Add the +CSQ: ( response:**

1. Add a new element to both arrays.
2. In ANSWER\_TABLE\_STR\_CArY, add a value to the new element: "+CSQ: (".
3. Calculate and enter the integer for ANSWER\_TABLE\_INT\_CArY: 1792

BITS	DECIMAL VALUES	BINARY VALUES	EXPLANATION
0-3	0	0000	Empty
4-6	0	000	No need to count commas
7-11	7	00111	Length of response string.
12-19	0	00000000	None
Result	1792	00000000011100000000	

### **Example: Add the +CREG Command**

This is a more complex and unusual example. It assumes that "OK" does not yet exist in the arrays.

#### **Step 1: Examine the Types of Commands and Their Responses**

The new +CREG command can have the following formats and responses:

Set command: AT+CREG= [<n>]

Solicited response: OK

Query command: AT+CREG=?

Solicited response: +CREG: (list of supported <n>s)

Query command: AT+CREG?

Solicited response: +CREG: 0,1

Unsolicited response: +CREG: 2, "07EF", "CC8E"

#### **Step 2: Interpret Responses**

SRV\_AT must differentiate between the different kinds of responses:

COMMAND	RESPONSE	INTERPRETATION
Set	OK	Easy for SRV_AT to interpret

COMMAND	RESPONSE	INTERPRETATION
Query (the first Query)	+CREG: (	Identifiable by the left parenthesis
Query (the second Query)	+CREG:	A solicited response has one or three commas
(Unsolicited response)	+CREG:	An unsolicited response has none or two commas

Therefore, SRV\_AT must parse the response string, searching for:

- A left parenthesis.
- The number of commas.

### Step 3: Enter the Rules into the Constant Arrays

Each type of response is checked and entered as required.

➔ **Add the OK response:**

1. Add a new element to both arrays.
2. In ANSWER\_TABLE\_STR\_CArY, add a string value to the new element: "OK".
3. In ANSWER\_TABLE\_INT\_CArY, enter the integer for the corresponding new element, calculated as shown in the table below. The value in this case is 512.

BITS	DECIMAL VALUES	BINARY VALUES	EXPLANATION
1-4	0	0000	Empty
5-7	0	000	No need to count commas
8-12	2	00010	Length of response string
13-20	38	00000000	None
Result	512	00000000001000000000	

➔ **Add the +CREG: ( response:**

1. Add a new element to both arrays.
2. In ANSWER\_TABLE\_STR\_CArY, add a value to the new element: "+CREG: (".
3. Calculate and enter the integer for ANSWER\_TABLE\_INT\_CArY: 2048

BITS	DECIMAL VALUES	BINARY VALUES	EXPLANATION
1-4	0	0000	Empty
5-7	0	000	No need to count commas
8-12	8	01000	Length of response string
13-20	0	00000000	None
Result	2048	00000000100000000000	

➔ **Add the +CREG: response:**

1. Add a new element to both arrays.
2. In ANSWER\_TABLE\_STR\_CArY, add a value to the new element: "+CREG:".
3. SRV\_AT must count commas, so add a constant name to ALL\_COMMANDS\_CHECKING\_CS, for example: "CGREG\_COMMAS" with the next available value (in this example, 2).
4. Use the name from the previous step to build a new constant integer array that holds the valid number of commas for identifying an unsolicited response (0 or 2 commas).  
Example: constant array name: CGREG\_COMMAS\_CIArY = {0, 2, -1}  
The -1 value indicates the end of the array.
5. Calculate and enter the integer for ANSWER\_TABLE\_INT\_CArY: 17924

BITS	DECIMAL VALUES	BINARY VALUES	EXPLANATION
1-4	0	0000	Empty
5-7	2	010	From ALL_COMMANDS_CHECKING_CS
8-12	6	00110	Length of response string
13-20	4	00000100	Unsolicited
Result	17924	00000100011000000100	

6. In the isUnsolicitedMsg: function, navigate to the code section following this comment:

```
\\Check for a match with required number of commas
```

Type two new lines:

```
else if <aUnsolicitedCommas> =
ALL_COMMANDS_CHECKING_CS.CREG_COMMAS
<index>:= self checkForMatch: CREG_COMMAS_CA lActualCommas:
<lActualCommas>
```

