

# Mapping **Multiple** 12 I/O Nodes to a 12 I/O Gateway



## Mapping **Multiple** 12 I/O Nodes to a 12 I/O Gateway

Follow these basic steps to map the inputs of four 12 I/O Nodes to the outputs of a 12 I/O Gateway.

Required equipment includes:

- Four 12 I/O Performance P7 (for NPN) or P8 (for PNP) Nodes
- One 12 I/O Performance P7 (for NPN) or P8 (for PNP) Gateway
- Windows-based PC running the User Configuration Tool (UCT) downloaded from the Banner website



1. Connect your Gateway to the Windows-based PC running the UCT software.
2. Click GET Gateway to load the Gateway's configuration settings into the UCT.
3. Configure the Nodes (see [Configure the 12 I/O Nodes for Bit Packing](#) on page 1).
4. Map the Node's inputs to the Gateway's outputs (see [Map the Node's Inputs to the Gateway's Outputs](#) on page 2).
5. Configure the Gateway (see [Configure the 12 I/O Gateway for Bit Packing](#) on page 2).

To add even more inputs or outputs to the Gateway, connect and configure the 12 I/O DX85 Remote I/O Modbus Slave device. This network configuration may also be connected to a host system that would access data using Modbus commands.

### Configure the 12 I/O Nodes for Bit Packing

The 12 I/O devices ship from the factory with six inputs and six outputs all stored within individual registers. Using the hardware DIP switches allows for different pre-set combinations of inputs and outputs in different Modbus register configurations. This tech note shows an example of a custom combination of inputs and outputs. Use the User Configuration tool for custom configurations.

Click GET Node for each Node to be configured. For this example, we are using Node 1 through Node 4.

Typically, inputs 1 through 6 are stored in registers 1 through 6 and outputs 9 through 14 are stored in registers 9 through 14. When bit-packing discrete data, all inputs are stored in register 1 and all outputs are stored in register 9. Refer to the device's datasheet for a detailed explanation about using these 12 I/O models.

Use the threshold parameter to define the information bit-packed into registers. Each bit of the threshold parameter defines an input or output. For example, set bit 0 to select input or output 1, set bit 1 to select input or output 2, et cetera.

1. For Node 1: Write 0000 0000 1111 = 0x000F = 15 to Node 1's I/O 1 threshold parameter to configure Node 1 to bit-pack inputs 1 through 4 into I/O 1 (register 1). These inputs will later be mapped to the Gateway's I/O 9 (register 9) using the UCT.

	Bits															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input #					12	11	10	9	8	7	6	5	4	3	2	1
Parameter Data					0	0	0	0	0	0	0	0	1	1	1	1

The first four inputs of Node 1 will be bit-packed into the Node's I/O 1 (register 1).

2. Verify all other inputs and outputs on Node 1 are disabled.

- For Node 2: Write 0000 0111 0000 = 0x0070 = 112 to Node 2's I/O 1 threshold parameter to configure Node 2 to bit-pack inputs 5 through 7 into I/O 1 (register 1). These inputs will later be mapped to the Gateway's I/O 10 (register 10) using the UCT.

		Bits															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input #						12	11	10	9	8	7	6	5	4	3	2	1
Parameter Data						0	0	0	0	0	1	1	1	0	0	0	0

- Verify all other inputs and outputs on Node 2 are disabled.
- For Node 3: Write 0001 1000 0000 = 0x0180 = 384 to Node 3's I/O 1 threshold parameter to configure Node 3 to bit-pack inputs 8 and 9 into I/O 1 (register 1). These inputs will later be mapped to the Gateway's I/O 11 (register 11) using the UCT.

		Bits															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input #						12	11	10	9	8	7	6	5	4	3	2	1
Parameter Data						0	0	0	1	1	0	0	0	0	0	0	0

- Verify all other inputs and outputs on Node 3 are disabled.
- For Node 4: Write 1110 0000 0000 = 0x0E00 = 3584 to Node 4's I/O 1 threshold parameter to configure Node 4 to bit-pack inputs 10 through 12 into I/O 1 (register 1). These inputs will later be mapped to the Gateway's I/O 12 (register 12) using the UCT.

		Bits															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input #						12	11	10	9	8	7	6	5	4	3	2	1
Parameter Data						1	1	1	0	0	0	0	0	0	0	0	0

- Verify all other inputs and outputs on Node 4 are disabled.

## Map the Node's Inputs to the Gateway's Outputs

Follow these steps to map the Nodes' inputs to the Gateway's outputs.

Source	Input #	Mapped To	Gateway Output #	Modbus Register
Node 1	Register 1 (bit-packed inputs 1–4)	→	Register 9 (bit-packed outputs 1–4)	9
Node 2	Register 1 (bit-packed inputs 5–7)	→	Register 10 (bit-packed outputs 5–7)	10
Node 3	Register 1 (bit-packed inputs 8–9)	→	Register 11 (bit-packed outputs 8–9)	11
Node 4	Register 1 (bit-packed inputs 10–12)	→	Register 12 (bit-packed outputs 10–12)	12

- On the Linking > Linking **Configuration** screen, click the arrow next to Node 1 to view its linking options.
- Next to Input 1 (enabled), select the Gateway from the drop-down list.
- Select the Gateway's I/O 9 from the drop-down list.
- Click Enabled and select the output type from the down-load list (if it isn't already selected).
- Select Packed.
- Repeat these steps for Nodes 2 through 4, mapping as shown.
- Click Send all I/O Links.  
The linking data for all Nodes is uploaded to the wireless network.

## Configure the 12 I/O Gateway for Bit Packing

Follow these steps to configure the Gateway to receive the four Nodes' bit-packed inputs.

- On the Gateway: Configure the Gateway to use all 12 I/O as outputs by setting DIP switches 5 and 6 to ON and switches 7 and 8 to OFF.
- On the UCT: Go to the **Configuration** > Device **Configuration** screen and verify the Gateway's inputs 1 through 6 and outputs 13 and 14 are disabled.

- Write to each Gateway output's Threshold parameter the same Threshold parameter number as was written for that particular Node.

Gateway Output	Threshold Parameter Value	Corresponding Node's Input
9	15	Node 1
10	112	Node 2
11	384	Node 3
12	3584	Node 4

- Click Send I/O Points.  
The parameter data for the Gateway's I/O points is uploaded to the wireless network.