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**Dube' et al.**

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(54) **MODBUS PLUS ETHERNET BRIDGE**

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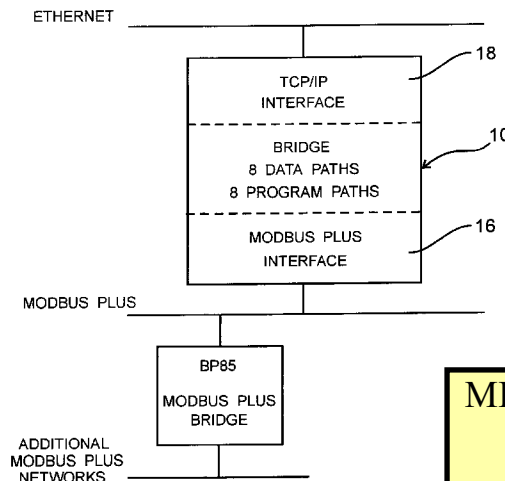
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(57) **ABSTRACT**

A bridge is disclosed for providing a connection between a MODBUS Plus network and an Ethernet network. The bridge includes a MODBUS circuit board, an Ethernet circuit board, and a CPU. The MODBUS circuit board is operably coupled to the local area network for receiving a message from an originating node having a five-byte routing path field. The CPU is operably connected to the circuit board for extracting a table location in response to a third byte within the routing path field. The Ethernet circuit board is operably connected to the CPU and the Ethernet network for forwarding the message to an IP destination in response to the table location.

**26 Claims, 12 Drawing Sheets**



**MICROSOFT - EXHIBIT 1030**  
**MICROSOFT CORP. v.**  
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PATH TYPE	OPENED IN NODE	OPENED FOR MODBUS COMMAND
DATA MASTER (DM)	ORIGINATOR	DATA ACCESS
DATA SLAVE (DS)	DESTINATION	DATA ACCESS
PROGRAM MASTER (PM)	ORIGINATOR	PROGRAMMING
PROGRAM SLAVE (PS)	DESTINATION	PROGRAMMING

Figure 1

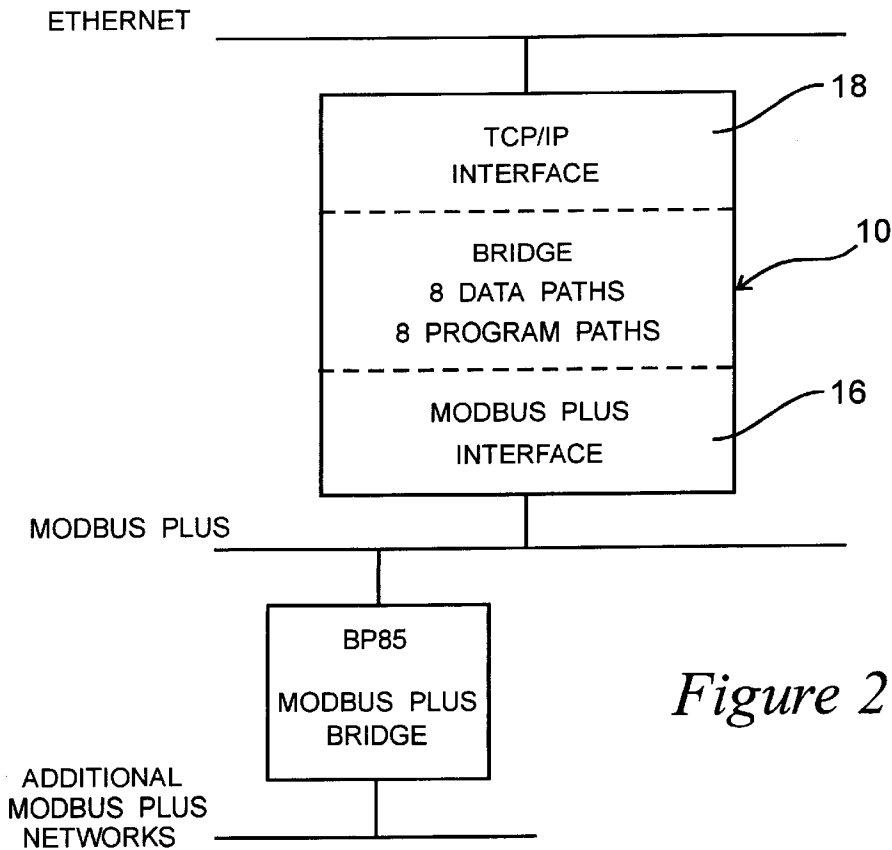


Figure 2

EXCEPTION CODE (HEXADECIMAL)	MEANING
01	ILLEGAL FUNCTION
02	ILLEGAL DATA ADDRESS
03	ILLEGAL DATA VALUE
04	UNEXPECTED FAILURE DURING COMMAND EXECUTION
05	ACK - - REQUESTED OPERATION IS IN PROGRESS
06	BUSY - - NOT READY TO PERFORM REQUESTED OPERATION
07	NAK - - REQUESTED OPERATION REJECTED
08	COULD NOT OPEN MODBUS PLUS PATH
09	ERROR DURING MODBUS PLUS SEND
0A	ERROR DURING MODBUS PLUS REPLY

*Figure 3*

FUNTION CODE (DECIMAL)	COMMAND NAME
1	READ DISCRETE OUTPUT STATUS (0xxxx)
2	READ DISCRETE INPUT STATUS (1xxxx)
3	READ OUTPUT REGISTER (4xxxx)
4	READ INPUT REGISTER (3xxxx)
5	FORCE SINGLE COIL (0xxxx)
6	PRESET SINGLE REGISTER (4xxxx)
7	READ EXCEPTION STATUS
8 SUBFUNCTION 21	GET/CLEAR NETWORK STATISTICS
15	FORCE MULTIPLE COILS (0xxxx)
16	PRESET MULTIPLE REGISTERS (4xxxx)
17	REPORT SLAVE ID

*Figure 4*

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