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Finding an Unknown IP Address

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During some integrations, I have seen a couple of problems some users usually have. When you are trying to connect some network devices and you use certain protocols, such as TCP and Modbus, you need to configure your PC in the same subnet in order to make both devices in the network visible; however, what happens when you do not know the IP address of the device you are going to integrate with HYPACK®? In some cases, you can use the device software to check or change the address, but it is not always possible.

Recently, I was helping a user configure an OPC server that uses the information that came from a PLC (programmable logic controller). The PLC was configured around 15 years ago and they did not have the software to verify the configuration, so I had to look for a way to find the IP address.

When you connect the network cable, most of the devices exchange messages to determine who is connected to the physical medium; thus, we can use Wireshark to analyze the packets exchanged.

In this example, I tested two devices that had a static IP address configured, one of those is the PLC that I mentioned before.

In the following screenshot, it is possible to see several messages that help us to determine the IP address of the PLC:

1. The PLC sent an ARP protocol message where you can see the IP address. This protocol uses the physical addresses (MAC) to map them with the IP addresses.
2. Some devices also send specific messages where you can see the source IP we are looking for.
3. Every network interface has a MAC address; this is a 6-digit, hexadecimal number that is usually printed on a label. This can help to determine which device sent the package.

FIGURE 1. Capture of the PLC Device.

No.	Time	Source	Destination	Protocol	Length	Info
22	207.834772	10.4.0.100	239.255.255.250	SSDP	216	M-SEARCH * HTTP/1.1
23	208.834802	10.4.0.100	239.255.255.250	SSDP	216	M-SEARCH * HTTP/1.1
24	211.929867	10.4.0.100	10.255.255.255	UDP	82	49152 → 1947 Len=40
25	236.722836	fe80::d41c:e148:32eb:52e0	ff02::1:2	DHCPv6	152	Solicit XID: 0xfe245c CID: 000100011fbfc43ae06995882780
26	254.038385	10.4.0.100	10.255.255.255	UDP	82	49152 → 1947 Len=40
27	254.489279	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100 1
28	271.858318	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
29	272.488996	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
30	273.489040	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
31	274.855159	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
32	275.489127	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
33	276.489138	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
34	280.854361	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
35	281.489318	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
36	282.489350	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
37	296.108023	10.4.0.100	10.255.255.255	UDP	82	49152 → 1947 Len=40
38	325.834855	10.4.0.100 2	239.255.255.250	SSDP	216	M-SEARCH * HTTP/1.1
39	326.835258	10.4.0.100	239.255.255.250	SSDP	216	M-SEARCH * HTTP/1.1
40	327.835294	10.4.0.100	239.255.255.250	SSDP	216	M-SEARCH * HTTP/1.1
41	328.836283	10.4.0.100	239.255.255.250	SSDP	216	M-SEARCH * HTTP/1.1
42	338.132650	10.4.0.100	10.255.255.255	UDP	82	49152 → 1947 Len=40
43	343.487655	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
44	352.056314	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
45	352.458036	10.4.0.100	10.255.255.255	BROWSER	253	Domain/Workgroup Announcement WORKGROUP, NT Workstation, Domain Enum
46	352.988016	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
47	353.988054	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
48	355.061177	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
49	355.988092	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100
50	356.988136	Pegatron_88:27:80	Broadcast	ARP	42	Who has 10.40.0.101? Tell 10.4.0.100

Frame 27: 42 bytes on wire (336 bits), 42 bytes captured (336 bits)

Encapsulation type: Ethernet (1)

Arrival Time: May 31, 2017 14:59:13.272191000 SA Pacific Standard Time

[Time shift for this packet: 0.000000000 seconds]

Epoch Time: 1496260753.272191000 seconds

[Time delta from previous captured frame: 0.450894000 seconds]

[Time delta from previous displayed frame: 0.450894000 seconds]

[Time since reference or first frame: 254.489279000 seconds]

Frame Number: 27

Frame Length: 42 bytes (336 bits)

Capture Length: 42 bytes (336 bits)

[Frame is marked: False]

[Frame is ignored: False]

[Protocols in frame: eth:ethertype:arp]

[Coloring Rule Name: ARP]

[Coloring Rule String: arp]

Ethernet II, Src: Pegatron_88:27:80 (e0:69:95:88:27:80), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

> Destination: Broadcast (ff:ff:ff:ff:ff:ff)

> Source: Pegatron_88:27:80 (e0:69:95:88:27:80)

Type: ARP (0x0806)

> Address Resolution Protocol (request)

0000	ff ff ff ff ff e0 69 95 88 27 80 88 06 00 01	i ..'.....
0010	08 00 06 04 00 01 e0 69 95 88 27 80 0a 04 00 64	i ..'.....d
0020	00 00 00 00 00 00 0a 28 00 65	(.e

In the following example, once I connected the cable, the messages my computer received are very clear. In my computer, I did not configure any IP address, but once the cable is plugged in, both devices started to exchange messages.

The IP address we were looking for was 192.168.15.20 and it was possible to see it because the device sent several multicast and broadcast packets.

Not all the devices send this kind of message; I have tested a couple that might not have all implemented protocols to meet the neighbors in the network.

FIGURE 2. No IP Configured in the PC.

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0
2	0.004182	fe80::496e:9a9:2214...	ff02::1:2	DHCPv6	157	Solicit XID: 0xf53c40 CID: 00010
3	0.020472	Panasoni_e3:39:0e	LLDP_Multicast	LLDP	58	NoS = 70:58:12:e3:39:0e TTL = 30
4	0.267790	Panasoni_e3:39:0e	Broadcast	ARP	42	Who has 169.254.48.248? Tell 0.0
5	0.267920	::	ff02::1:ff14:30f8	ICMPv6	78	Neighbor Solicitation for fe80::
6	0.267989	fe80::496e:9a9:2214...	ff02::2	ICMPv6	62	Router Solicitation
7	0.268069	fe80::496e:9a9:2214...	ff02::16	ICMPv6	90	Multicast Listener Report Messag
8	0.764523	fe80::496e:9a9:2214...	ff02::16	ICMPv6	90	Multicast Listener Report Messag
9	0.953818	192.168.15.20	224.0.0.251	MDNS	512	Standard query response 0x001f f
10	0.954254	192.168.15.20	224.0.0.113	ALLJOY...	78	VERSION 0 WHOHAS
11	0.954256	192.168.15.20	192.168.15.255	ALLJOY...	78	VERSION 0 WHOHAS
12	0.954258	192.168.15.20	224.0.0.113	ALLJOY...	78	VERSION 1 WHOHAS
13	0.954258	192.168.15.20	192.168.15.255	ALLJOY...	78	VERSION 1 WHOHAS
14	0.954913	192.168.15.20	224.0.0.251	MDNS	288	Standard query 0x0021 PTR _alljo
15	0.966242	192.168.15.20	224.0.0.22	IGMPv3	62	Membership Report / Join group 2
16	1.005609	fe80::496e:9a9:2214...	ff02::1:2	DHCPv6	157	Solicit XID: 0xf53c40 CID: 00010
17	1.026515	Panasoni_e3:39:0e	LLDP_Multicast	LLDP	58	NoS = 70:58:12:e3:39:0e TTL = 30
18	1.054241	192.168.15.20	224.0.0.251	MDNS	512	Standard query response 0x001f f
19	1.054504	192.168.15.20	224.0.0.251	MDNS	288	Standard query 0x0021 PTR _alljo
20	1.081668	192.168.15.20	192.168.15.255	SSDP	309	NOTIFY * HTTP/1.1
21	1.081992	192.168.15.20	192.168.15.255	SSDP	318	NOTIFY * HTTP/1.1
22	1.081993	192.168.15.20	192.168.15.255	SSDP	365	NOTIFY * HTTP/1.1
23	1.081994	192.168.15.20	192.168.15.255	SSDP	363	NOTIFY * HTTP/1.1
24	1.082170	192.168.15.20	192.168.15.255	SSDP	375	NOTIFY * HTTP/1.1
25	1.082255	192.168.15.20	192.168.15.255	SSDP	373	NOTIFY * HTTP/1.1
26	1.082334	192.168.15.20	192.168.15.255	SSDP	309	NOTIFY * HTTP/1.1
27	1.082417	192.168.15.20	192.168.15.255	SSDP	318	NOTIFY * HTTP/1.1
28	1.082518	192.168.15.20	192.168.15.255	SSDP	365	NOTIFY * HTTP/1.1
29	1.082613	192.168.15.20	192.168.15.255	SSDP	363	NOTIFY * HTTP/1.1
30	1.082721	192.168.15.20	192.168.15.255	SSDP	375	NOTIFY * HTTP/1.1
31	1.082809	192.168.15.20	192.168.15.255	SSDP	373	NOTIFY * HTTP/1.1
32	1.096329	192.168.15.20	224.0.0.22	IGMPv3	70	Membership Report / Join group 2
33	1.101419	192.168.15.20	192.168.15.255	SSDP	375	NOTIFY * HTTP/1.1
34	1.152458	192.168.15.20	192.168.15.255	SSDP	384	NOTIFY * HTTP/1.1
35	1.155208	192.168.15.20	224.0.0.251	MDNS	512	Standard query response 0x001f f
36	1.155477	192.168.15.20	224.0.0.251	MDNS	288	Standard query 0x0021 PTR _alljo
37	1.193052	192.168.15.20	224.0.0.113	ALLJOY...	161	VERSION 0 ISAT
38	1.193063	192.168.15.20	192.168.15.255	ALLJOY...	161	VERSION 0 ISAT
39	1.193954	192.168.15.20	224.0.0.113	ALLJOY...	187	VERSION 1 ISAT
> Frame 11: 78 bytes on wire (624 bits), 78 bytes captured (624 bits) on interface 0						
> Ethernet II, Src: LgElectr_08:19:5c (3c:cd:93:08:19:5c), Dst: Broadcast (ff:ff:ff:ff:ff:ff)						
> Internet Protocol Version 4, Src: 192.168.15.20, Dst: 192.168.15.255						
> User Datagram Protocol, Src Port: 9956, Dst Port: 9956						
0000	ff ff ff ff ff ff 3c cd	93 08 19 5c 08 00 45 00	<. ...\.E.			
0010	00 40 03 b4 40 00 40 11	96 95 c0 a8 0f 14 c0 a8	.@..@.@.			
0020	0f ff 26 e4 26 e4 00 2c	c5 29 00 01 00 78 8d 02	..&.&., .)....x..			
0030	0c 3a 31 47 5a 73 34 68	76 6f 2e 32 2a 10 6f 72	.:1GZs4h vo.2*.or			
0040	67 2e 61 6c 6c 6a 6f 79	6e 2e 73 6c 2e 2a	g.alljoy n.sl.*			