SharkFest'22 US
Kansas City, MO
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#sf22us

Duct tape and baling wire: Extending Wireshark with Lua

Chuck Craft
Your Company Here

set_plugin_info(presenter_info)

```
local presenter_info =
{
    version = "SF22US Kansas City",
    author = "Chuck Craft",
    description = "Wireshark contributor",
    repository = "https://www.linkedin.com/in/cpu4coffee"
}
```

(yep - that's a valid version string. Try it in your Lua code.)

Pre-req / Foundation Info

- https://sharkfestus.wireshark.org/sf15
  - wslua - who/what/why/… (Why not Python)
  - Walk through of test/lua/dissector.lua

Down the Rabbit Hole

- Finding an obscure or elegant solution in Wireshark is exciting but at a certain point the original question / problem needs to be solved.

- Pick a threshold of when to move on:
  - Time invested
  - Solution checklist of steps to try
  - Wireshark source code

#1 - ARP Target IP Address

https://ask.wireshark.org/question/22016/resolved-or-mapped-arp-target-ip-address/

"Is there a display filter that can be used to apply as column, the resolved or mapped host name for an ARP target IP address?

This string value is shown in the packet details window."

#1 - ARP Target IP Address


```
    3 0.110617  cpe-24-166-172-1.kc.res.rr.com      Broadcast   ARP   60    24.166.173.161
    4 0.211791  cpe-65-28-78-1.kc.res.rr.com       Broadcast   ARP   60    65.28.78.76

> Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface unknow
> Ethernet II, Src: Cisco251_af:f4:54 (00:07:0d:af:f4:54), Dst: Broadcast (ff:ff:ff:ff:f
v Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: cpe-65-28-78-1.kc.res.rr.com (00:07:0d:af:f4:54)
    Sender IP address: cpe-24-166-172-1.kc.res.rr.com (24.166.172.1)
    Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)
    Target IP address: cpe-24-166-173-159.kc.res.rr.com (24.166.173.159)

Target IP address (arp.dst.proto_ipv4), 4 bytes
```

#1 (cont)

- !!! Sample capture: 220703_arp-storm.pcapng
  https://wiki.wireshark.org/SampleCaptures
- Add column for original field: `arp.dst.proto_ipv4`
- Resolve names enabled: `View->Name Resolution`
- What's in the Conversations/Endpoints?

#1 (cont)

- Is there a better field to use?
  - Display Filter Reference

    https://www.wireshark.org/docs/dfref/a/arp.html
  - `tshark -G fields | grep -i resolved | grep -i arp`

- Is there a Preference setting to be tweaked?

- Code spelunking (even deeper in the rabbit hole)

  See the original Ask question

Make the plugin already

- Have now spent more time looking for a solution than it will take to write/test the Lua plugin. (xkcd 627)
- Six easy steps to write a plugin (Templatized):
  - Step 1 - document as you go
  - Step 2 - create a protocol to attach new fields to
  - Step 3 - add field(s) to Step 2 protocol
  - Step 4 - Field extractor to copy packet field data
  - Step 5 - create the postdissector function that will run on each frame/packet
  - Step 6 - register the new protocol as a postdissector

Step 1 - Document

```
-- arp_host.lua
-- https://ask.wireshark.org/question/22016/resolved-or-mapped-arp-target-ip-address/
-- Sample capture: https://wiki.wireshark.org/SampleCaptures#arp-rarp - arp-storm.pcap

-- Step 1 - document as you go. See header above and set_plugin_info().
local arp_host_info =
{
    version = "1.0.0",
    author = "Good Coder",
    description = "Arp IP Target - resolved",
    repository = "Floppy in top drawer"
}

set_plugin_info(arp_host_info)
```

Step 2 - new Protocol

```
-- Step 2 - create a protocol to attach new fields to
local arp_host_p = Proto.new("arp_host","Arp IP Target - resolved")
```

- Analyze -> Reload Lua Plugins
- Analyze -> Enabled Protocols…

Step 3 - add results field

```
-- Step 3 - add some field(s) to Step 2 protocol
local pf = {
  target_host = ProtoField.string("arp_host.target", "ARP target (resolved)")
}

arp_host_p.fields = pf
```

- Analyze -> Reload Lua Plugins
- View -> Internals -> Supported Protocols

Step 4 - get original field

```
-- Step 4 - create a Field extractor to copy packet field data.
local arp_target_f = Field.new("arp.dst.proto_ipv4")
```

Step 5 - "miracle occurs"

```
-- Step 5 - create the postdissector function that will run on each frame/packet
function arp_host_p.dissector(tvb,pinfo,tree)
    local subtree = nil

    -- copy existing field(s) into table for processing
    finfo = { arp_target_f() }

    if (#finfo > 0) then
        if not subtree then
            subtree = tree:add(arp_host_p)
        end
        for k, v in pairs(finfo) do
            -- process data and add results to the tree
             subtree:add(pf.target_host, v.display)
        end
    end
end
```

Step 6 - register dissector

```
-- Step 6 - register the new protocol as a postdissector
register_postdissector(arp_host_p)
```

- Analyze -> Reload Lua Plugins
- Display Filter:

```
arp_host.target matches "[a-z]"
```

wsluarm

- Wireshark's Lua API documented in WSDG
  https://www.wireshark.org/docs/wsdg_html/
- Generated by scripts from epan/wslua_* source
  See doc/README.wslua
- wslua Index - available on Wiki
  https://wiki.wireshark.org/lua#wireshark-s-lua-api

EASYPOST.lua

- A template file for a simple post dissector
  https://wiki.wireshark.org/lua#examples

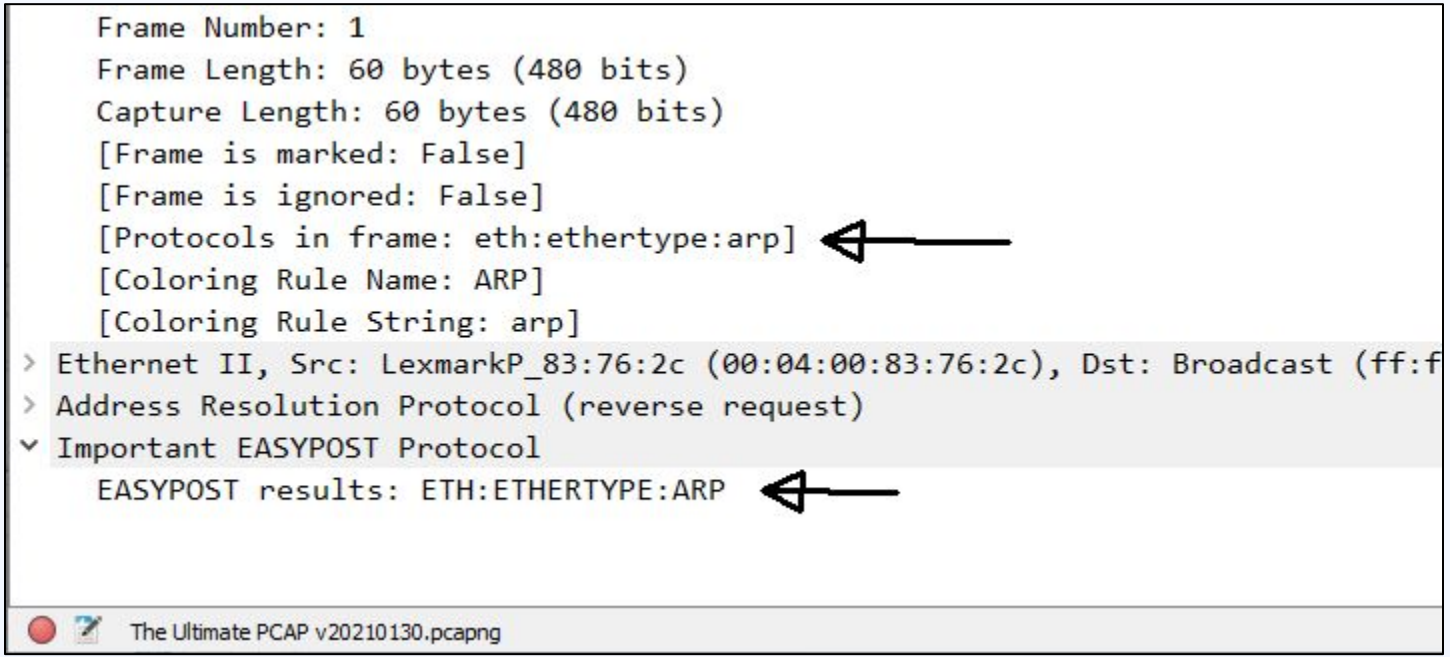
EASYPOST.lua - fields

```
-- Step 3 - add some field(s) to Step 2 protocol
local pf = {
    results = ProtoField.string("easypost.results", "EASYPOST results")
}

easypost_p.fields = pf

-- Step 4 - create a Field extractor to copy packet field data.
easypost_results_f = Field.new("frame.protocols")
```

EASYPOST.lua - results

```
finfo = { easypost_results_f() }

if (#finfo > 0) then
      if not subtree then
            subtree = tree:add(easypost_p)
      end
      for k, v in pairs(finfo) do
            -- process data and add results to the tree
            local field_data = string.format("%s", v):upper()
            subtree:add(pf.results, field_data)
      end
end
```

EASYPOST.lua - results



ws_expert.lua

- https://gitlab.com/wireshark/wireshark/-/issues/15990

  "... create a display filter to display frames with more than one expert info:

  count(_ws.expert.message)>4

  Would be nice to be able to add a column count(_ws.expert.message) to sort on and have available when analyzing."

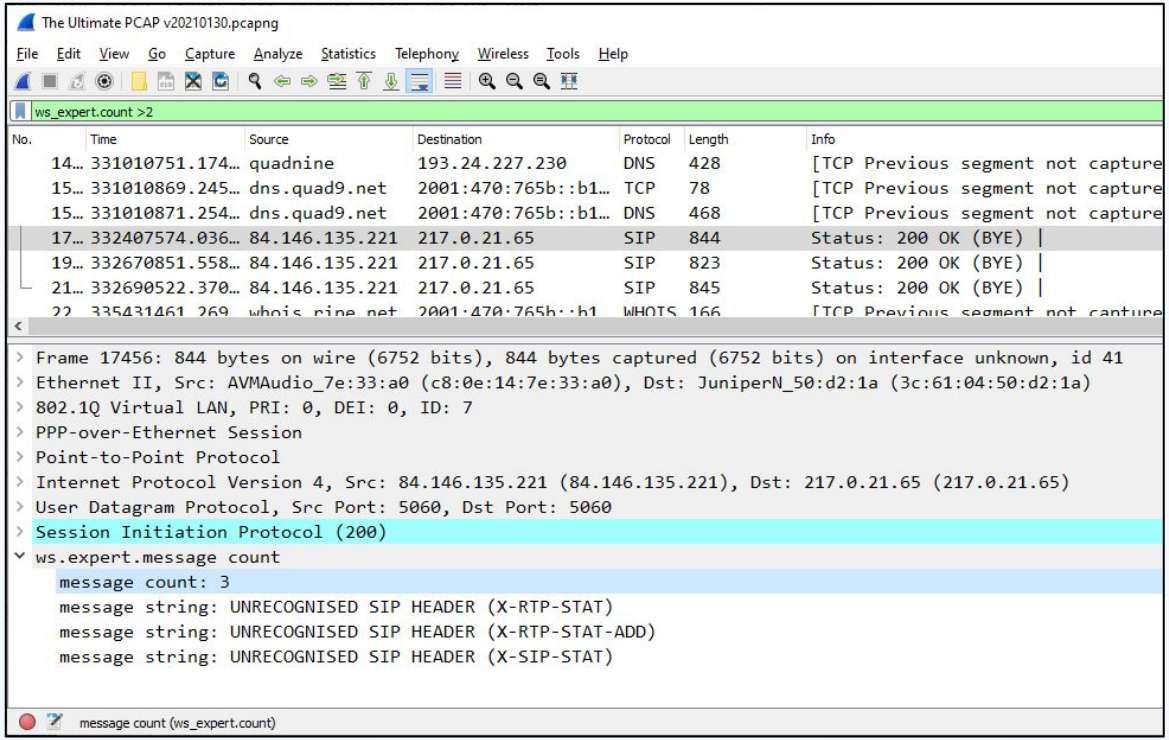
ws_expert.lua - fields

```
-- Step 3 - add some field(s) to Step 2 protocol
local pf = {
  ws_count = ProtoField.uint8("ws_expert.count", "message count"),
  ws_string = ProtoField.string("ws_expert.string", "message string")
}

ws_expert_p.fields = pf

-- Step 4 - create a Field extractor to copy packet field data.
local ws_expert_message_f = Field.new("_ws.expert.message")
```

ws_expert.lua - results

```
finfo = { ws_expert_message_f() }

 if (#finfo > 0) then
     if not subtree then
         subtree = tree:add(ws_expert_p)
     end
     subtree:add(pf.ws_count, #finfo)
     for k, v in pairs(finfo) do
         -- process data and add results to the tree
          local field_data = string.format("%s", v):upper()
          subtree:add(pf.ws_string, field_data)
     end
 end
```

ws_expert.lua - results



How to display slice as a filter in column?

- https://ask.wireshark.org/question/27207/how-to-display-slice-as-a-filter-in-column/