Communication Networks Laboratory
The University of Kansas EECS 780
Introduction to Protocol Analysis with Wireshark

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https://www.ittc.ku.edu/~jpgs/courses/nets
Protocol Analysis with Wireshark

Outline

L1.0 EECS 780 laboratory outline
L1.1 Motivation and overview
L1.2 Wireshark installation and use
L1.3 Protocol analysis examples
L1.4 Getting started
EECS 780 Laboratories

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EECS 780 Laboratories
Semester Outline

• Wireshark labs
  – throughout semester, intuitive, based on textbook
• Wiki and web authoring
  – requires KU, or ITTC account
• Socket programming
  – relatively simple lab to demonstrate socket concepts
• Network simulation
  – lab to introduce network simulation
Protocol Analysis with Wireshark
Motivation and Overview

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Motivation and Overview

Introduction

• Wireshark is a *network protocol analyzer*
  – www.wireshark.org
• First released in 1998 by Gerald Combs as Ethereal
  – many contributors around the world
• Open source and free software
• Graphical alternative to tcpdump
Motivation and Overview

Introduction

- Powerful tool for network troubleshooting
- Sniffs and captures live traffic
- Filters data for ease of analysis
- Statistics and graphs available
- Used in industry and academia
Protocol Analysis with Wireshark
Wireshark Installation and Use

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Wireshark Installation

Highlights

• Wireshark can be installed on various platforms
  – UNIX, MS, Linux, Mac OS, etc
• Most recent release is v.2.4.0, 19 July 2017
• System requirements
  – section 1.2 at
    http://www.wireshark.org/docs/wsug_html/
  – rule of thumb: fast CPU, more memory is better
• FAQs and Wiki pages provide more information
Wireshark Installation
Overview

• Installation of Wireshark requires
  – downloading the relevant package
    • building the source into binary if the source is downloaded
  – install binaries to their destinations
  – section 2 provides detailed installation instructions
    http://www.wireshark.org/docs/wsug_html/

• Windows installation includes WinPcap
  – packet capture library (also needed for tcpdump)

• Installation easy and intuitive
Wireshark Usage

Windows 10 Installation

Go to wireshark.org

Click on Download Wireshark

Save and run the executable (.exe) file

Installation wizard is intuitive
pcap library is required to capture low-level network messages

WinPcap for Windows, libpcap for UNIX/Linux

Latest WinPcap release 4.1.3
Wireshark Installation

Windows 10 Installation
Wireshark Usage

Main Features

• Capturing live traffic
  – data can be captured on wired or wireless medium
• Numerous protocols can be captured and analyzed
• Filtering is essential when dealing with lots of packets
  – filters can be applied on protocols, fields, values, etc.
  – filtering while capturing packets is possible
Wireshark GUI

Main Window

- Menu
- Main toolbar
- Filter toolbar
- Packet list pane
- Packet details pane
- Packet bytes pane
- Status bar
Wireshark Usage

Starting Capture

To capture: go to Capture menu and select Options...

Start capturing on interface that has IP address

Other ways of capturing possible
Once the capturing starts, until the data is exchanged on Network Interface Card (NIC), main window will be blank.
Wireshark Usage
Capturing

When packets exchanged on NIC, the packets will be dumped to main window.
Capturing can be stopped by clicking on “Stop the running capture” button on the main toolbar.

Wireshark Usage

Stopping Capture
Filter by entering the “protocol name or field name” and click the apply button in the filter menu.

Detailed filters can be applied by creating expressions.
Protocol Analysis with Wireshark
Protocol Analysis and Examples

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Protocol Analysis with Wireshark

Protocol Analysis

- Packets/protocols can be analyzed after capturing
- Individual fields in protocols can be easily seen
- Graphs and flow diagrams can be helpful in analysis
Protocol Analysis and Examples

Packet Details Pane

Analysis is performed manually

Example shows TCP segment with SYN and ACK fields set to 1
Protocol Analysis and Examples

Packet Byte Pane

Zoom in or out is possible in main toolbar

Packet Byte pane consists of offset, Hex, and ASCII fields
Protocol Analysis and Examples

Statistics – Flow Graph Example

TCP plots and flow graphs are available in Statistics menu.
Protocol Analysis with Wireshark

Getting Started

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Getting Started
Installation and First Lab Exercise

- Install Wireshark and familiarise
- Get first “Getting Started” exercise
  - student resources web page at
    https://www.pearsonhighered.com/cs-resources/products/product.html#product, isbn=0133594149
  - or author Web site
    https://www.net.cs.umass.edu/wireshark-labs
- Complete first Wireshark Lab – Getting Started
  - follow EECS 780 submission instructions and email report
    • to grader cc to professor
    - Subject: EECE780 - wireshark getting started
    - attach file <lastname>-wireshark-getting-started.pdf
Protocol Analysis with Wireshark

Acknowledgements

Some material in these foils comes from the textbook supplementary materials:

  http://kuroseross.com
- http://www.wireshark.org/
- http://www.winpcap.org/