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 EECS, KU, or ITTC account
- Socket programming
  - relatively simple lab to demonstrate socket concepts
- Network simulation
  - lab to introduce network simulation
- Hands-on network performance evaluation
  - configure Cisco router, utilise open source tools
- Others if time permits
  - programmable networks using GpENI testbed
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.1.8.4, Nov. 2012
- 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 XP Installation

Go to wireshark.org

Click on Download Wireshark

Save and run the executable (.exe) file

Installation wizard is intuitive
Wireshark Usage
Windows XP Installation

pcap library is required to capture low-level network messages

WinPcap for Windows, libpcap for UNIX/Linux

Latest WinPcap release 4.1.2
Wireshark Installation

Windows XP 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 Interfaces...

Start capturing on interface that has IP address

Other ways of capturing possible
Wireshark Usage

Capturing

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.
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 the Statistics menu.

Example shows a flow diagram of the ping utility.
Protocol Analysis with Wireshark

Getting Started

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Getting Started
Installation and First Lab Exercise

• Install Wireshark
• Go to student resources web page at
• Complete first Wireshark Lab – *Getting Started*
• Familiarize yourself with Wireshark
Protocol Analysis with Wireshark

Acknowledgements

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

- Kurose & Ross,
  http://kuroseross.com

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