802.420

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Overview

- Purpose
- Features
- Design
- Implementation

Purpose

- Ethernet repeater
- Analytics
- Traffic shaping
- Network reliability / diagnostics

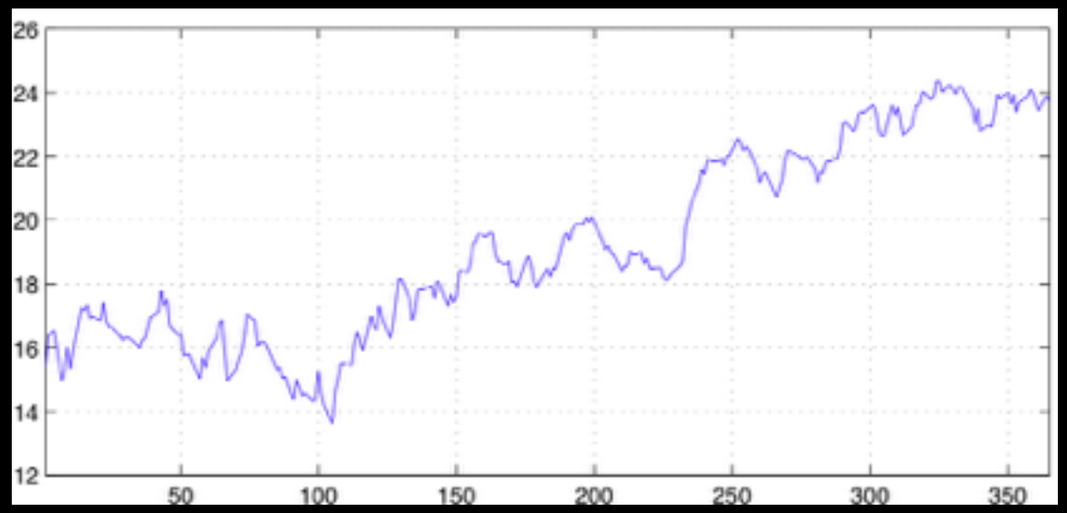
Features

- Monitor Traffic Categories / Sources
- Blocking / Throttling / Expediting traffic streams
- Monitor connectivity (ping / bandwidth / fragmentation)
- Detect suspicious port scans (nmap)
- Smarter drop policies
- VGA display - traffic streams and stats
- Keyboard controller to select streams
- Simple Piezo-speakers for notifications

Monitor Traffic

World of Warcraft - 50ms ping

Bandwidth Usage [Mbps]:
Priority - High
Buffer Size - Low
Drop Policy - RED



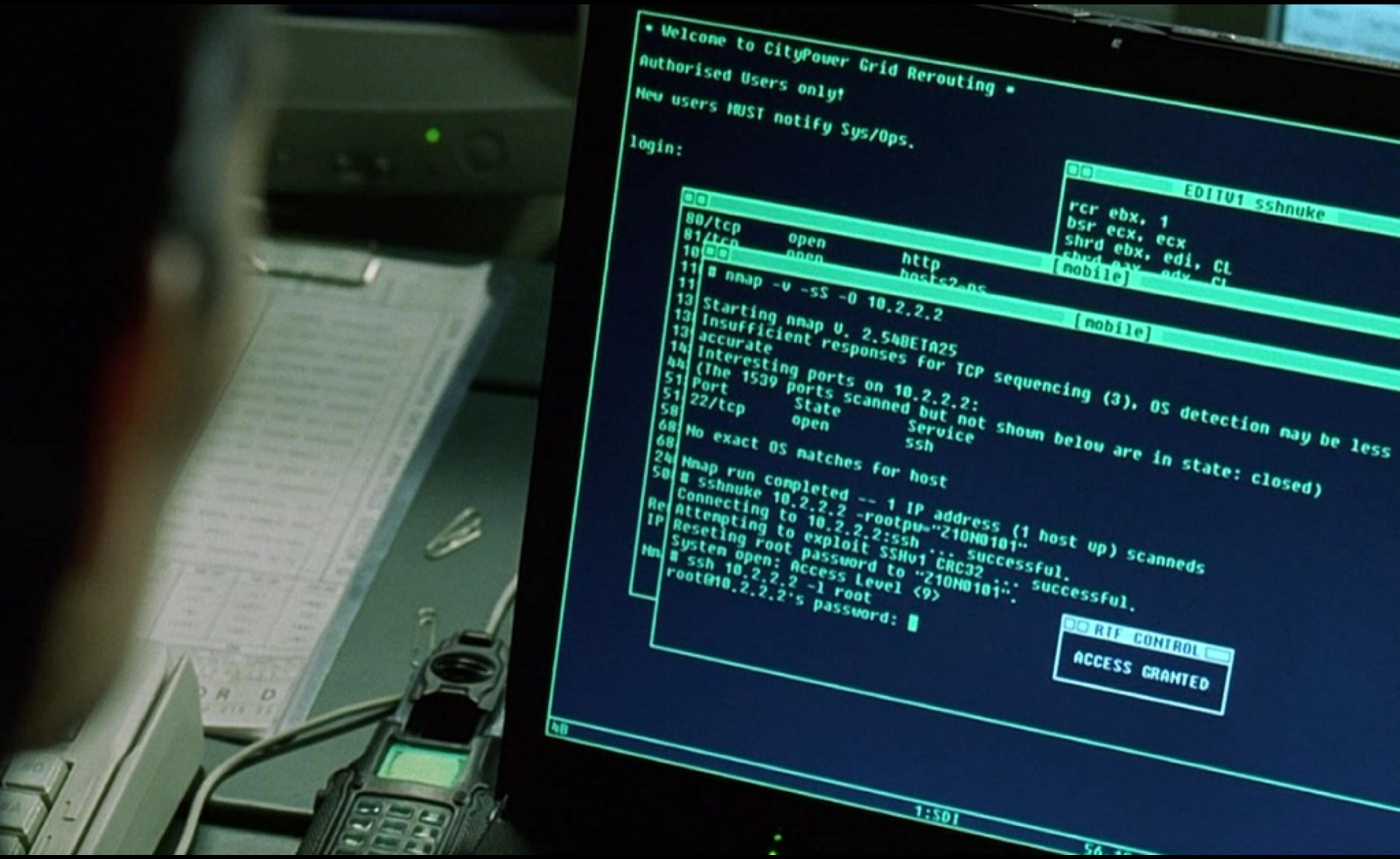
Blocking / Throttling/ Expediting

North Korean Source

ece545.com

reddit.com

Security


* Welcome to CityPower Grid Rerouting *
Authorised Users only!
New users MUST notify Sys/Ops.
login:
EDIT V1 sshnuke
rcr ebx, 1
bsr ecx, ecx
shrd ebx, edi, CL
[nobile]
nmap -v -sS -O 10.2.2.2
Starting nmap V. 2.54BETA25
Insufficient responses for TCP sequencing (3), OS detection may be less accurate
Interesting ports on 10.2.2.2:
(The 1539 ports scanned but not shown below are in state: closed)
Port State Service
22/tcp open ssh
No exact OS matches for host
Nmap run completed -- 1 IP address (1 host up) scanned
sshnuke 10.2.2.2 -rootpw="Z1ON0101"
Connecting to 10.2.2.2:ssh ... successful.
Attempting to exploit SSHv1 CRC32 ... successful.
Reseting root password to "Z1ON0101".
System open: Access Level <9>
ssh 10.2.2.2 -l root
root@10.2.2.2's password:
RTF CONTROL
ACCESS GRANTED
1:SDI

Tail Drop vs RED

Global TCP Synchronization

Counter LDoS

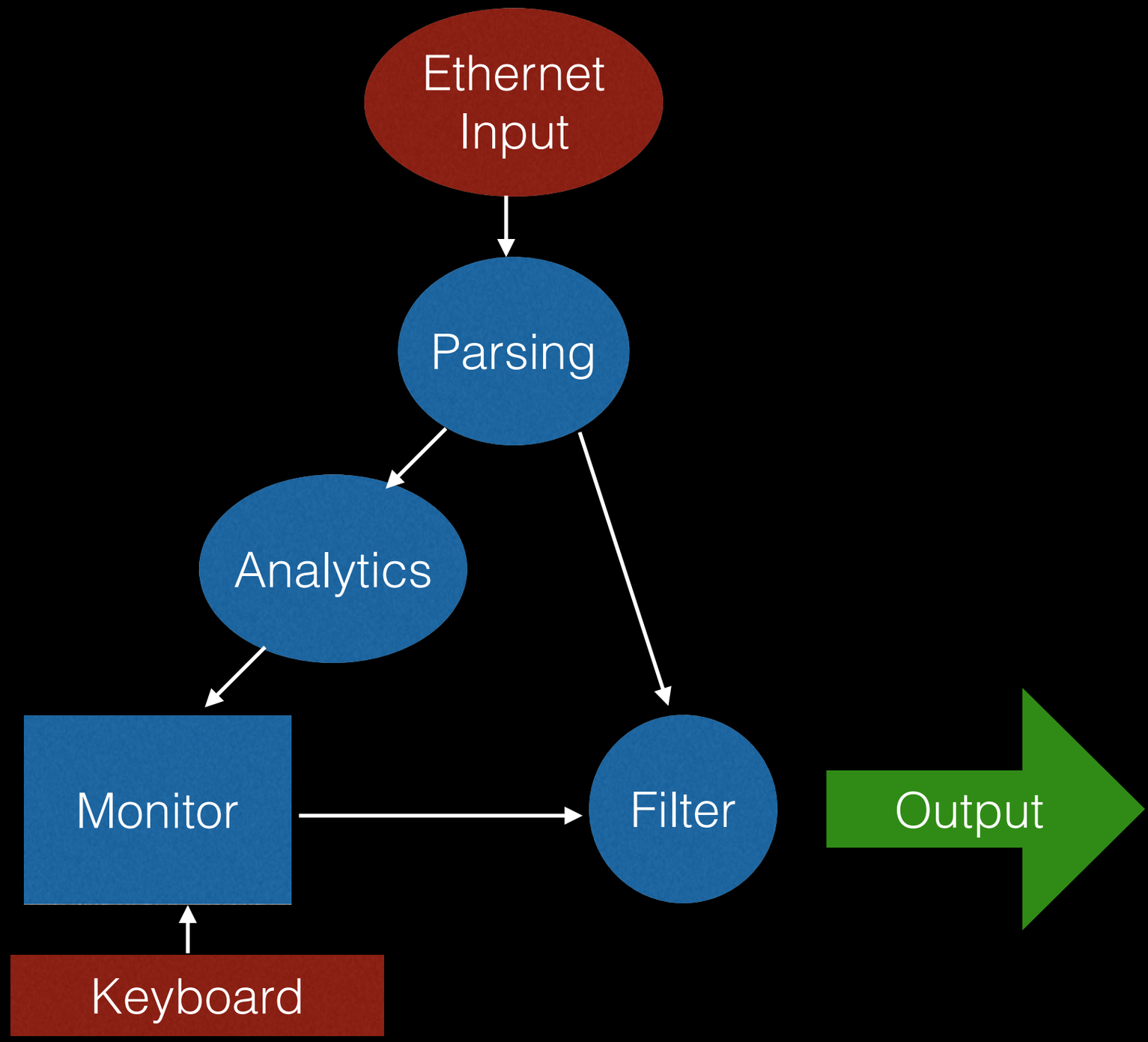
http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6510186&tag=1

Experiment

Buffer Bloat

Ping to measure bloat

Design


Ethernet Input
Parsing
Analytics
Monitor
Filter
Output
Keyboard

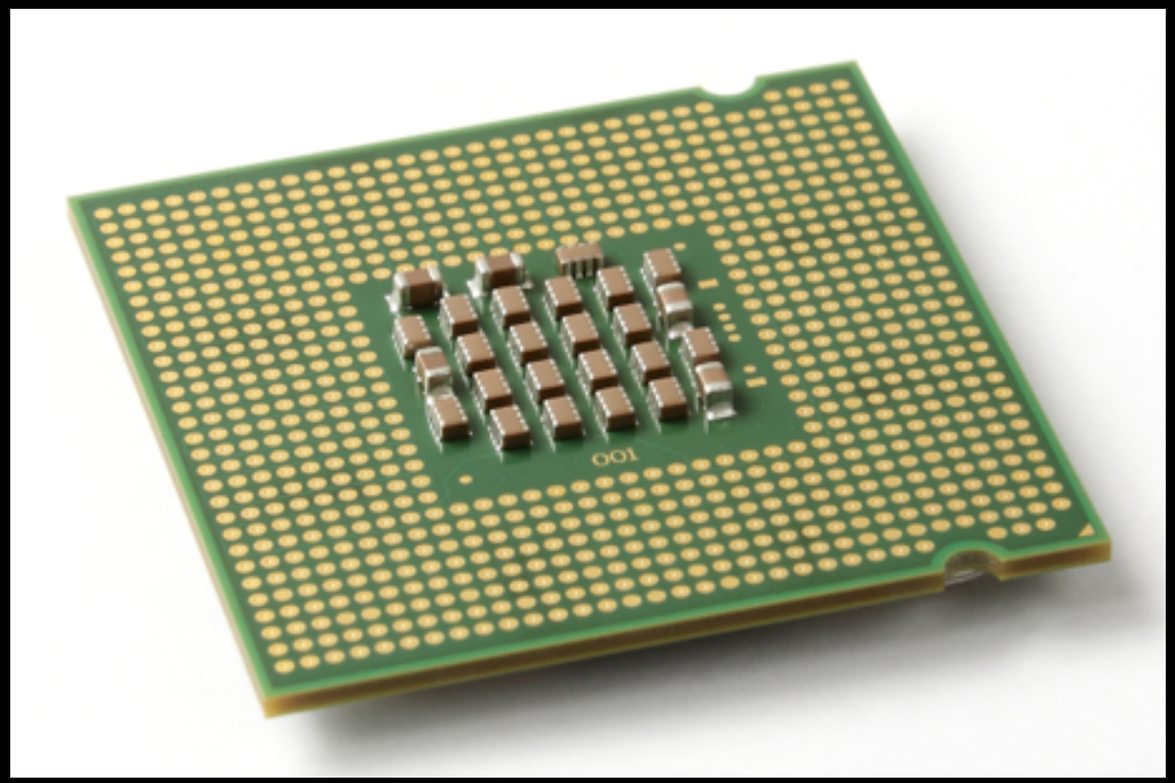
Implementation

802.3 Ethernet packet and frame structure

Layer	Preamble	Start of frame delimiter	MAC destination	MAC source	802.1Q tag (optional)	Ethertype (Ethernet II) or length (IEEE 802.3)	Payload	Frame check sequence (32-bit CRC)	Interpacket gap
	7 octets	1 octet	6 octets	6 octets	(4 octets)	2 octets	46(42)[b]–1500 octets	4 octets	12 octets
Layer 2 Ethernet frame			← 64–1518(1522) octets →						
Layer 1 Ethernet packet	← 72–1526(1530) octets →								

Lex and Parse

Analytics



Filter

Expected Challenges

- Delimiting and parsing packets quickly is non-trivial
- 1 Gbps
- Reconstructing packets

Questions?