ET4394 Wireless Networking

Wireshark Project: Distribution of Frame Types
Group: ALGG1

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Methodology of Work and Plan of Action

- Locations inside TUDelft campus: 3mE, EWI, Library
  - Scanned all channels for all the available APs
  - Captured in the channel in which ‘eudoram’ had the strongest signal
- Other Locations: Dorms, Café
  - Scanned all channels for all the available APs
  - Captured in the channel accommodating the most APs with strong signals

- 1 hour per recording session
- 25 hours recorded in total

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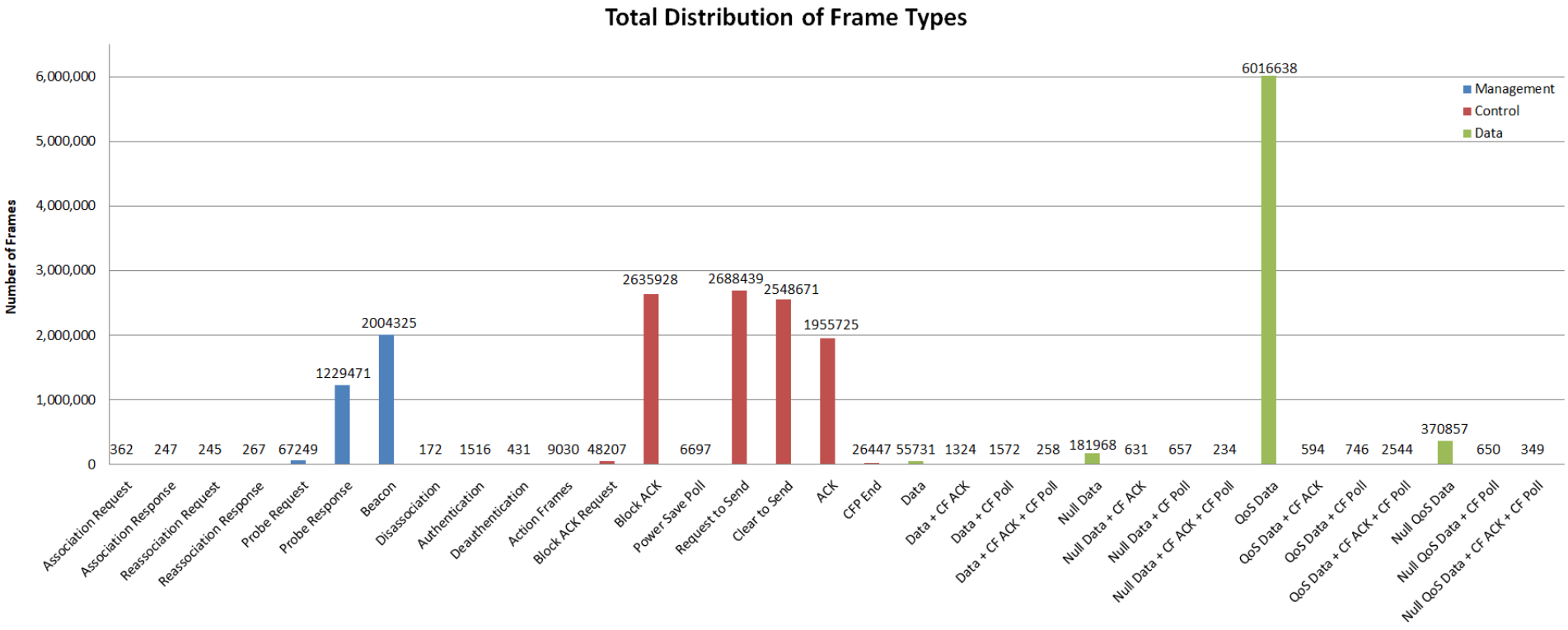
- OS: Kali Linux
- Network Protocol Analyzer: TShark
  - Recorded information: Frame Subtype, Length, Data Rate, Duration, FCS Status
  - 1 hour recording session ⇨ approximately 50mB / file
  - Indicative exported file with the desired information:

```
wlan.fc.type_subtype    frame.len    wlan_radio.data_rate    wlan_radio.duration wlan.fcs.status
8    321 1    2312    1
28   70  24   28  1
25   88  24   32  1
27   76  12   36  1
27   76  12   36  1
40   1580     19.5    668 1
40   1580     19.5    668 0
8    321 1    2312    1
28   70  24   28  1
8    321 1    2312    1
27   76  24   28  1
28   70  24   28  1
25   88  24   32  1
8    321 1    2312    1
8    321 1    2312    1
```

- Script Programming Language: Python
- Exported info: min, max, average per field

Experimental Results



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Frame Type	Management	Control	Data
Number of Frames	3313315	9910114	6634753
Min Length (Bytes)	78	62	76
Max Length (Bytes)	3326	88	4150
Average Length (Bytes)	339.04	76.47	928.24
Min Data Rate (Mb/s)	1	1	1
Max Data Rate (Mb/s)	48	54	173.33
Average Data Rate (Mb/s)	10.02	22.2	73.64
Min Duration (μs)	32	24	28
Max Duration (μs)	3808	448	12624
Average Duration (μs)	1593.2	34.09	240.78
Status: Good	3313315	9910114	5133389
Status: Bad	0	0	1501364

Frame type and subtype	Airtime (secs)	Bits (MB)	Frames (1000s)	Avg. Rate (Mbps)
Data	6802	1884	5540	6.46
Originals	3616	1276	3988	7.30
Retransmits	3185	608	1552	4.31
Control	1418	74	5442	1.89
Ack.	1332	69	5135	1.90
RTS	42	3	142	1.69
CTS	40	2	155	1.75
PS poll	2	0	10	1.60
Management	878	82	1098	1.12
Assoc. Req.	1	0	2	1.42
Assoc. Res.	1	0	3	1.08
Authentication	6	0	13	1.13
Beacon frame	412	39	428	1.00
Deauth.	0	0	0	1.30
Dissassoc.	6	0.40	13794	1.00
Probe Req.	177	16.07	333707	1.35
Probe Res.	270	25.44	296250	1.00
Reassoc. Req.	0	0.03	2727	1.00
Reassoc. Res.	0	0.03	621	1.00
Totals	9098	2040	12080	3.92

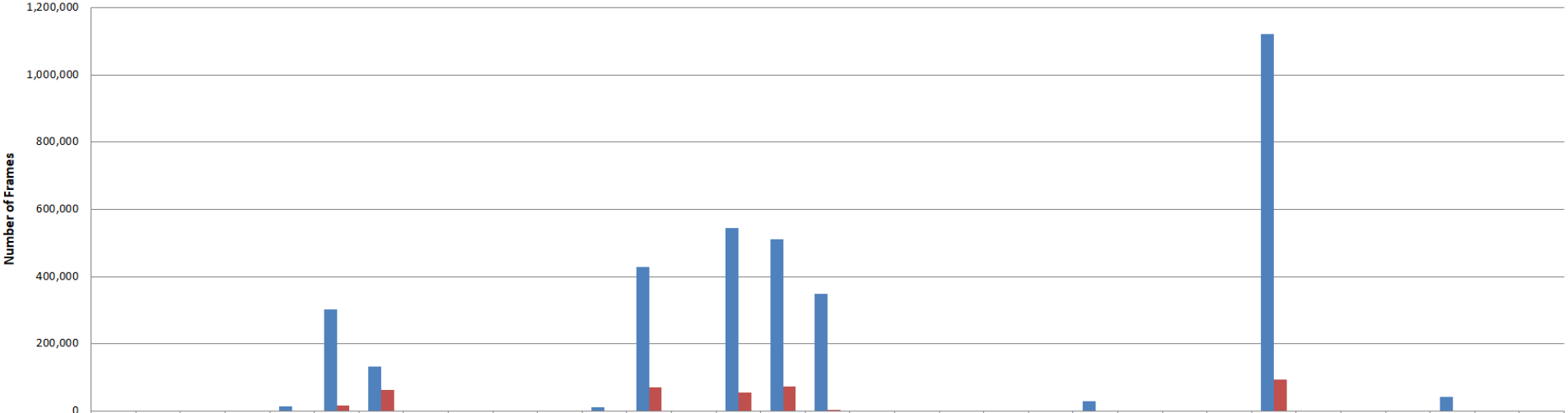
[1]

[1] Rodrig et al. **Measurement-based Characterization of 802.11 in a Hotspot Setting**, ACM SIGCOMM'05 Workshop, Aug. 22–26, 2005, Philadelphia, PA, USA
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.80.6621&rep=rep1&type=pdf

TUDelft Library

Distribution of Frame Types

Working Day - Weekend



	Association Request	Association Response	Reassociation Request	Reassociation Response	Probe Request	Probe Response	Beacon	Disassociation	Authentication	Deauthentication	Action Frames	Block ACK Request	Block ACK	Power Save Poll	Request to Send	Clear to Send	ACK	CFP End	Data	Data + CF ACK	Data + CF Poll	Data + CF ACK + CF Poll	Null Data	Null Data + CF ACK	Null Data + CF Poll	Null Data + CF ACK + CF Poll	QoS Data	QoS Data + CF ACK	QoS Data + CF Poll	QoS Data + CF ACK + CF Poll	Null QoS Data	Null QoS Data + CF Poll	Null QoS Data + CF ACK + CF Poll
Working Day	185	104	112	119	14761	303326	132881	76	823	110	1808	11772	430064	298	543876	510790	348876	1657	1456	200	455	55	31035	218	254	58	1E+06	88	155	534	42059	181	120
Weekend	0	0	0	0	570	15834	62262	0	0	0	9	2049	69916	0	54664	74591	4315	446	481	18	22	1	112	10	3	7	94309	4	10	18	78	10	5

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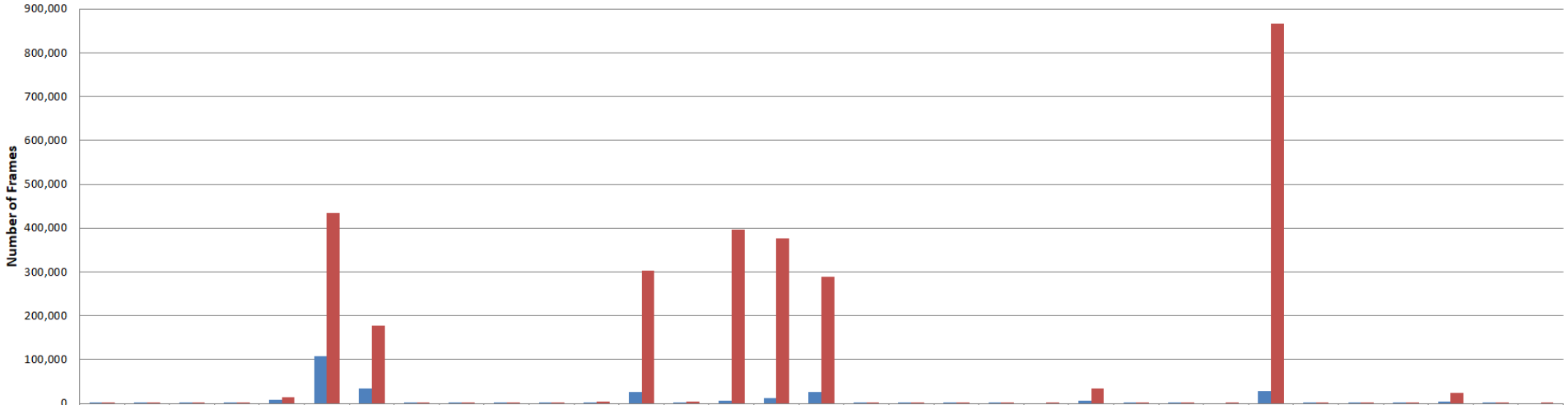
Distribution of Frame Types

3mE - EWI

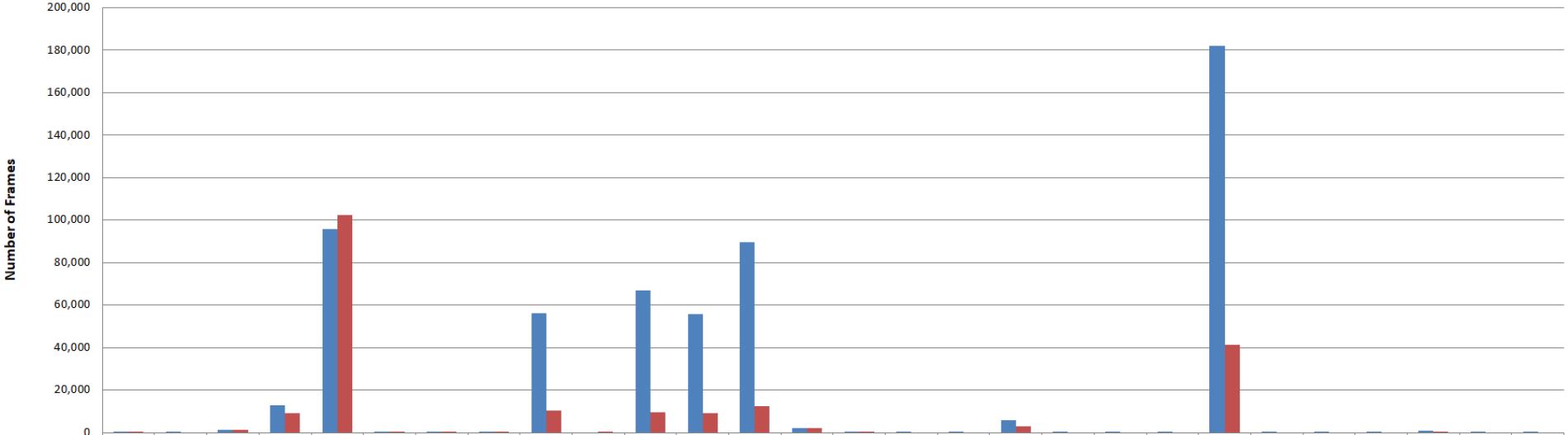


	Association Request	Association Response	Reassociation Request	Reassociation Response	Probe Request	Probe Response	Beacon	Disassociation	Authentication	Deauthentication	Action Frames	Block ACK Request	Block ACK	Power Save Poll	Request to Send	Clear to Send	ACK	CFP End	Data	Data + CF ACK	Data + CF Poll	Data + CF ACK + CF Poll	Null Data	Null Data + CF ACK	Null Data + CF Poll	Null Data + CF ACK + CF Poll	QoS Data	QoS Data + CF ACK	QoS Data + CF Poll	QoS Data + CF ACK + CF Poll	Null QoS Data	Null QoS Data + CF Poll	Null QoS Data + CF ACK + CF Poll
3mE	57	1	19	7	7623	108050	33993	5	68	2	186	79	26348	16	5792	12180	27017	7	673	3	3	0	7208	2	1	0	28539	1	1	7	4618	1	0
EWI	73	98	78	100	14475	435282	176962	67	435	204	2065	4829	302392	5253	396696	377063	288791	810	1996	71	168	21	35165	103	101	39	866581	48	79	222	23453	83	51

Dorm 1

Distribution of Frame Types

Midday - After Midnight



	Association Response	Reassociation Request	Probe Request	Probe Response	Beacon	Authentication	Action Frames	Block ACK Request	Block ACK	Power Save Poll	Request to Send	Clear to Send	ACK	Data	Data + CF ACK	Data + CF Poll	Data + CF ACK + CF Poll	Null Data	Null Data + CF ACK	Null Data + CF Poll	Null Data + CF ACK + CF Poll	QoS Data	QoS Data + CF ACK	QoS Data + CF Poll	QoS Data + CF ACK + CF Poll	Null QoS Data	Null QoS Data + CF Poll	Null QoS Data + CF ACK + CF Poll
Midday	1	1	1178	12661	95628	2	115	152	55979	0	66741	55663	89749	2284	13	10	1	5976	3	4	5	181997	7	6	12	1011	6	4
After Midnight	1	0	1283	9176	102335	1	6	38	10218	2	9675	8918	12452	2242	2	0	0	2992	0	0	0	41397	0	0	0	242	0	0

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Conclusions

- Approximately same distribution in all the experiments
- Amount of frames:

  Control ⇨ Data ⇨ Management
- Majority of bits:

  Data ⇨ Management ⇨ Control
- QoS feature utilized by most STAs
- RTS/CTS mechanism enabled in most STAs
- Both active and passive scanning are used
- Resulting graphs verified the theoretical expectations

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