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# A Characterization of Wireless Network Interface Card Active Scanning Algorithms

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A CHARACTERIZATION OF WIRELESS NETWORK INTERFACE CARD ACTIVE

SCANNING ALGORITHMS

by

VAIBHAV GUPTA

Under the Direction of Raheem A. Beyah

ABSTRACT

In this thesis, we characterize the proprietary active scanning algorithm of several wireless network interface cards. Our experiments are the first of its kind to observe the complete scanning process as the wireless network interface cards probe all the channels in the 2.4GHz spectrum. We discuss the: 1) correlation of channel popularity during active scanning and access point channel deployment popularity; 2) number of probe request frames statistics on each channel; 3) channel probe order; and 4) dwell time.

   The knowledge gained from characterizing wireless network interface cards is important for the following reasons: 1) it helps one understand how active scanning is implemented in different hardware and software; 2) it can be useful in identifying a wireless rogue host; 3) it can help implement Active Scanning in network simulators; and 4) it can radically influence research in the familiar fields like link-layer handovers and effective deployment of access points.

INDEX WORDS:    IEEE 802.11 Active Scanning, Probe Request Frame, Wireless Network
                Interface Card, Host Association

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# DEDICATION

To all the nameless inventors and researchers,

who ameliorate our lives but never get acknowledged.

# ACKNOWLEDGEMENTS

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# LIST OF ABBREVIATIONS

AP        Access Point

CDF      Cumulative Distribution Function

IEEE     Institute of Electrical and Electronics Engineer

IDS       Intrusion Detection System

IV        Initialization Vector

LAN      Local Area Network

MAC     Media Access Control

OS        Operating System

PRF      Probe Request Frame

QoS      Quality of Service

TCP/ IP   Transmission Control Protocol/ Internet Protocol

WEP     Wired Equivalent Privacy

WNIC    Wireless Network Interface Card

# CHAPTER 1 - INTRODUCTION

With the advent of IEEE 802.11 wireless standards [1], it has become easier to connect to other networking devices. These IEEE 802.11 standards have become popular due to ease in the deployment of LANs, without requiring wired Ethernet as the connecting medium. The cheap cost of the equipment required to create wireless LANs, its ability to support high data rates and the dynamic expansion this network architecture supports, is among the few reasons for its widespread popularity. Supporting its omnipresence, more than 70 million 802.11 enabled devices were sold worldwide in the second quarter of 2006 [2].

The rise of new networking standards like IEEE 802.16 (WiMax) and IEEE 802.16e (Mobile-WiMax) [3] has ensured that not only is wireless networking here to stay, but will become more adaptable and widespread, ensuring better QoS and higher data rates.

Drawing comparisons with the wired Ethernet, wireless networks also suffer from all the security problems that plague the wired networks. Much is due to the fact that the wireless networks are more of an extension of the wired Ethernet standards. These standards are relatively new and are not thoroughly designed to meet the current QoS needs. Wireless networks also suffer from certain security problems, which are pertinent to only this kind of network architecture.

This chapter introduces the problems dealing with rogue host identification, efficacy of access point deployment and efficient Media Access Layer Handovers.

The 802.11 wireless networks suffer from some peculiar problems unlike the wired networks. As the hosts are not physically connected to the access point and share the unlicensed Industrial Scientific and Medical 2.4GHz spectrum, it is easier for a rogue host to access this network. The three fundamentals required at the MAC layer for securing the network communications are confidentiality, integrity and access control. Confidentiality certifies that the data being sent can only be interpreted by the intended receiver. Integrity ensures that this data is not manipulated. And access control ensures that only legitimate users have access to the wireless network.

The WEP is the most common method used to secure an IEEE 802.11 wireless network, servicing the above security needs. WEP in the original IEEE 802.11 standard has the following cryptographic weaknesses [4]:

1) The IV is too small:

WEP uses the IV along with the WEP encryption key as the input to the RC4 pseudo-random number generator, which produces a key stream that is used to encrypt the 802.11 frame payload. With a 24-bit WEP IV, it is easy to capture multiple WEP frames with the same IV value, making real-time decryption easier.

2) Weak data integrity:

WEP data integrity consists of performing the Cyclic Redundancy Check-32 checksum calculation on the bytes in the unencrypted 802.11 payload and then encrypting its value with WEP. Even encrypted, it is relatively easy to change bits in the encrypted payload and then properly update the encrypted CRC-32 result, preventing the receiving node from detecting that the frame contents have changed.

3) Uses the master key rather than a derived key:

The WEP encryption key, either manually configured or determined through 802.1X authentication, is the only available keying material. Therefore, the WEP encryption key is the master key. Using the master key to encrypt data is less secure than using a key derived from the master key.

4) No re-keying:

WEP does not provide for a method to refresh the encryption keys.

5) No replay protection:

WEP does not provide any protection against replay attacks, in which an attacker sends a series of previously captured frames in an attempt to gain access or modify data.

To exploit these weaknesses of the WEP, a large number of tools can be freely downloaded from the Internet. Thus, it is has become easier to eavesdrop on a particular wireless communication, compromise the login credentials of a legitimate user, and then access the secure network. To overcome such a security flaw, many methods have been proposed and some among them are being utilized. Profiling a host machine and then using the profiled knowledge to provide access to the network is a common approach. This profiling can use one or more combinations of the following methods: MAC address, OS fingerprinting using TCP/IP stack, pre-installed software for authentication on the host machine.

Profiling/ characterizing known security attacks, hardware and software which can be used for such attacks, is a known method for fingerprinting and creating signatures and can be used in a real attack scenario. A good example for this would be the previous successful profiling in the field of denial of service attacks [5], Bluetooth devices [6], network worms [7], etc.

Software tools like Nmap [8], P0f [9], etc. can be freely downloaded from the Internet to fingerprint an OS.

Using the same approach of fingerprinting hardware and software remotely, our characterization attempt is the first of its kind in the research community to passively listen on all the channels of the IEEE 802.11 2.4 GHz spectrum. The benefits of this approach and the choice of profiling which we undertake has innumerous and unparallel advantages which are discussed in the following sections. Such an approach when employed remains effective even when an attacker attempts to manipulate the hardware/software configurations of his own machine.

A key reason for choosing this kind of profiling is to attempt to understand the active scanning algorithm which is a part of IEEE 802.11 MAC layer functions. The information gathered from profiling these WNICs can be used to effectively deploy APs. It is a common approach to deploy APs on channels 1, 6 and 11. Previous researches have shown that the time a WNIC spends scanning for APs is the highest among all the activities during the association phase [10]. However, no effort has been made by the research community to understand the reasons behind it. We experimentally find the reasons behind this occurrence and show how the current AP deployment schemes and the active scanning algorithms used by the WNICs can be held responsible for such large scanning overheads which directly affect the QoS standards. Reducing these active scanning overheads can drastically reduce the AP handover delays. An AP handover delay can be described as the time it takes for a host machine to scan and associate with another AP and dissociating with the previously associated AP. These scanning delays if removed can help provide better QoS, namely for seamless audio and video connectivity.

Another key application of our work is in the field of wireless network simulations. As we discuss in chapter 3, we noticed that all network simulators ignore using active scanning

parameters and its values while creating a simulation. Our profiled data can be of great importance, which helps characterizing different WNIC hardware and software's. Such information can be directly used in network simulators, improving the accuracy of simulations. Without such knowledge in the simulating environment, the results of any wireless experiments can be challenged for its accuracy.

# CHAPTER 2 – OVERVIEW OF WIRELESS NETWORK INTERFACE CARD

The essential hardware to communicate on a wireless channel is a WNIC. A WNIC is responsible for handling the management and the data level communication with another host or an AP. To do so, the IEEE 802.11 standard specifies two layers:

a) The Physical Layer (PHY Layer)

b) The Medium Access Control Layer (MAC Layer)

The PHY layer is embedded in the hardware of the WNIC. It is responsible for encoding and transmission of data over various network communication media. Our work focuses on the MAC layer functions. The MAC Layer is responsible for managing and maintaining communication between various networking devices. It coordinates access to a shared radio channel and utilizes standardized protocols to facilitate communication between these devices. We profile the active scanning algorithm, which is an integral function of the MAC Layer.

## 2.1 - Active Scanning

The IEEE 802.11 standard specifies the essentials of all the services a WNIC should implement. However, some of the features have been left vaguely specified for a WNIC manufacturer to implement. It is the set of these features that we use to profile a WNIC.

Scanning for wireless networks is an important function of the IEEE 802.11 MAC protocol. The wireless node attempts to search for active wireless networks and then attempts to associate with them. The IEEE 802.11 standard defines both types of scanning techniques; active scanning and passive scanning. In passive scanning mode, the WNIC listens on one channel at a time for Beacon Frames from APs [11]. It records the corresponding signal strength and other relevant information about the AP. Using this information, the WNIC then chooses which AP to associate with. In the case of active scanning, PRFs are transmitted on all the channels. The responses received from APs in the form of Probe Response Frames are then subsequently processed by the WNIC [11]. Active scanning is the default scanning technique for a WNIC, which enables it to implore an immediate response from an AP, without waiting for the beacon frames to be sent by it.

Following are the guidelines described in the IEEE 802.11 MAC Layer standard for active scanning [1]. For each channel to be scanned:

a) Wait until the ProbeDelay time has expired or a PHYRxStart.indication has been received.

b) Perform the Basic Access procedure to determine it may transmit.

c) Send a probe (PRF) with the broadcast destination, SSID and broadcast BSSID.

d) Clear and start a ProbeTimer.

e) If PHYCCA.indication (busy) has not been detected before the ProbeTimer reaches MinChannelTime, then clear Network Allocation Vector and scan the next channel, else when ProbeTimer reaches MaxChannelTime, process all received probe responses;

f) Clear Network Allocation Vector and scan the next channel.

ProbeDelay is the delay to be used prior to transmitting a PRF on a new channel. MinChannelTime is the minimum amount of time to be spent on each channel. MaxChannelTime is the maximum amount of time to be spent on each channel.

## 2.2 – Parameters for Distinction

As mentioned in Chapter 2.1, the active scanning procedure is not thoroughly defined in the IEEE 802.11 standards, resulting in WNIC manufacturers to implement their proprietary active scanning algorithms.

The parameters that can vary depending on the WNIC include:

a) Channel on which the $1^{st}$ PRF is sent

b) Number of PRFs sent

c) Burstiness of PRFs

d) Probe delays between PRFs (dwell time)

e) Order of channels probed

These parameters govern the performance of any active scanning algorithm.

## CHAPTER 3 - RELATED WORK

In this chapter, we briefly highlight the previous attempts to characterize the active scanning algorithm. We list the limitations of some of the previous work done in this field and empirically provide our analysis.

It has been shown on previous occasions that active scanning algorithm is an important parameter which can help profile different WNICs [12, 13]. Previous attempts in the research community to profile the active scanning algorithm have remained inclined to sniffing on selective channels. These selective channels are either randomly chosen or have been based on limited study [12, 13]. However, the focus has mainly resided on passively listening on selective channels, trying to distinguish one WNIC from another. Our work takes a more expansive approach by listening on all the channels of the IEEE 802.11 2.4GHz spectrum. Such an approach is not biased to gather information on only few channels and rather gathers information on all the 11 channels (2.4GHz spectrum for USA) of the wireless spectrum. This approach allows us to not only distinguish WNICs more precisely, but to fundamentally characterize the proprietary active scanning algorithm for each WNIC chipset.

Also, there have been many successful attempts to create more efficient active scanning algorithms [14, 15, 16]. Different techniques like selective active channel scanning, network neighborhood graphs, fast active scanning, etc. have been proposed to cut down the AP handover latency. The focus of these algorithms has solely resided in providing a faster active scanning algorithm without understanding the previous existing active scanning algorithms and their

needs. It is imperative to thoroughly understand the existing active scanning algorithm before trying to write newer algorithms. The reason why we lay emphasis on this is due to the fact that several researches have made assumptions that were found to not hold as per our experiments [15, 17, 18]. Most of the new active scanning algorithms have been proposed after being simulated or tested in controlled environments only. Such kind of a controlled environment is very sensitive to parameters which help simulate the environment. Any inaccurate or wrong parameter and its value can lead to an environment which is biased. Not knowing the parameters that can influence the performance of the active scanning algorithm and the values of these parameters, defeats the effectiveness of the new active scanning algorithm applied in the real world scenario. We describe this problem in more details in chapter 4.

# CHAPTER 4 - MOTIVATION

Simulation tools like OPNET [19], NS-2 [20], GTNeTs [21], etc. do not take active scanning into consideration. The only simulation tool we noticed that takes active scanning into consideration is QualNet [22]. However, we did not find parameters which were WNIC specific that could be introduced into any simulated environment. This approach does not distinguish the active scanning algorithm of one WNIC from another, which neglects the dynamic behavior of active scanning that change with each implementation. Our work helps by laying guidelines to the parameters and their values which should be added to every wireless research and simulation.

Also lately, a lot of effort by the research community has been focused on reducing the link-layer handover delays of hosts between APs, which typically ranges from 300-550ms [10]. Without a thorough understanding of how a WNIC behaves while scanning for APs, it is difficult to introduce an effective scheme which can reduce these handover delays. Almost 90% of the time in a handover process is spent scanning for wireless networks [10, 16]. Reducing these active scanning delays is necessary for improving the quality of service, namely for seamless audio and video connectivity.

The same knowledge can be applied for efficient deployment of APs in a wireless network. With the knowledge of how different active scanning algorithms work, APs can be deployed on the channels from which the WNICs start scanning, thereby reducing the initial association time.

Another important encouraging factor is the promising use of our work in wireless network security. Such a detailed profiling of WNICs can be useful for network administrators for detecting unauthorized WNICs types. Techniques like MAC address spoofing and password phishing are known to easily circumvent security policies. But it is difficult to change the signature of a WNIC. Such profiling of wireless hardware has applications in both military and civilian use.

## CHAPTER 5 - EXPERIMENTAL SETUP

This chapter describes the experimental setup of the host using different WNICs and the sniffers employed to passively listen on all the 11 channels. The test-bed was verified to be free from any interference from other wireless devices operating on the same 2.4 GHz spectrum.

### 5.1 - Hardware Setup



Figure 1. Test-bed

For passively listening on all the channels, a total of 6 Lenovo 3000 C100 laptops running Fedora Core 4, kernel ver. 2.6.11-1.1369 with 512 MB RAM were used. The sniffer used the internal Intel PRO/Wireless 2915ABG WNIC.

### 5.2 - Software Setup

To listen/ sniff the frames on the wireless network, the Intel PRO/Wireless 2915ABG WNIC was used with the driver ipw2200 ver. 1.1.2 and firmware ver 3.0 [23]. The ipw2200

driver allows the WNIC to be put on the monitor mode. Monitor mode (RFMON mode) allows a WNIC to sniff all the wireless traffic on a particular channel to which the WNIC is tuned. Monitor mode is similar to the promiscuous mode used for packet sniffing in wired networks. To obtain the channel number for each frame, radiotap header [23] was enabled. The radiotap header was originally designed for Berkley Software Distribution. The radiotap header format provides additional information about frames, from the driver to user-space applications such as *libpcap* [24], and from a user-space application to the driver for transmission. To synchronize the captures on all the 6 laptops, Network Time Protocol [25] via the Linux utility *crontab* was used. The captures were made using the tool *tcpdump* [26] and each trial span for four minutes. These captures were synchronized and automated via the *crontab*.

To parse the capture traces and selectively pick the desired information from these traces, a *C* language based parser was written. The files generated from this parser were used to create MATLAB [27] structures. We wrote several MATLAB programs which used these MATLAB structures and provided us a wealth of statistical information necessary for concluding our experiments.

## 5.3 - Experimental Problems

Our initial attempt was to use an external WNIC along with the internal WNIC. The goal was to capture traffic on the entire spectrum of 11 channels using the 6 laptops. We were able to use Airlink AWLC4030 and the D-Link DWL-650 WNICs using the Madwifi ver. 0.9.2 driver [28] for this purpose. But we observed that these two WNICs using the Madwifi driver captured one-third or even fewer frames compared to the internal Intel 2915 WNIC. One theory for this

could be that the Hardware Abstraction Layer [28], which is part of the Madwifi driver, down samples the number of PRFs. As a result of the poor performance of the WNIC and driver combination, we decided to only use the internal Intel 2915 WNIC. Thus, our experiments were broken down into two sets of channels.

We first conducted 100 trials for channels 1-6 and then another 100 trials for channels 7-11 for each of the WNIC. We then merged these files successively, removing the difference in the timestamps from when these two sets of experiments were started. Thus, we were able to examine the activity on all 11 channels for each WNIC for a given period. The wealth of information resulting from examining the entire 2.4GHz spectrum is far more accurate than examining selective channels at a time.

**5.4 - Integrity of the Results**
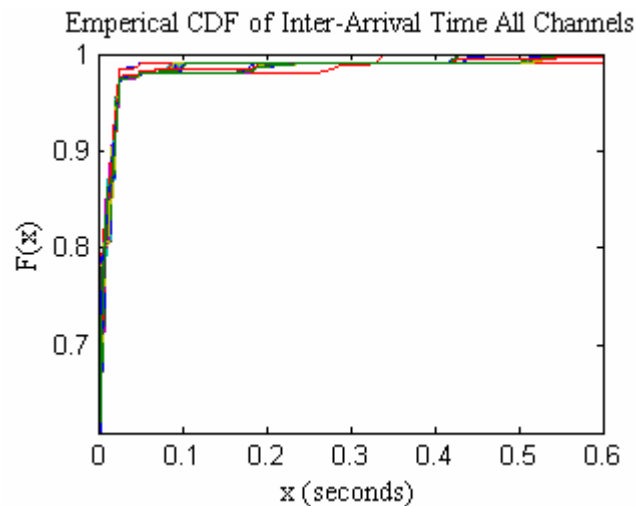


Figure 2(a).  CDF of Inter-Arrival Time for Intel (All channels, 100 trials, interval $10^{-3}$ seconds)
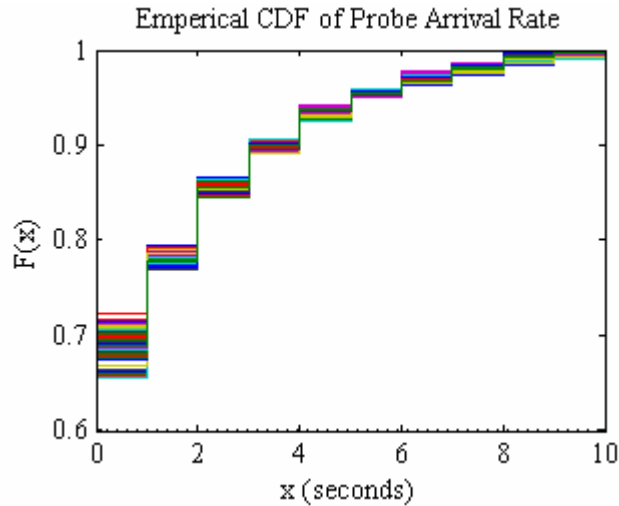
Figure 2(b). CDF of Probe-Arrival Rate for Intel (All channels, 100 trials, interval $10^{-3}$ seconds)

To ensure that the capture files were merged properly, we plotted the CDF, Fig. 2(a), showing the Inter-Packet Arrival Time and Fig. 2(b), showing the Probe Arrival Rate for Intel PRO/Wireless 2915ABG WNIC for each trial. We notice that there is a significant overlap between trials in the CDF plot. This asserts that each trial followed a similar pattern and our approach of merging the files preserved the integrity of the experimental data. We did the above two CDF plots for all the WNICs we profiled. The integrity of the experiments was found to be consistent for all the WNICs.

**5.5 – Wireless Network Interface Cards Profiled**

The WNICs profiled and the drivers used by them are mentioned in Table -1. For ease of discussion, throughout this report we will address these WNICs as Airlink, D-Link, Intel, Link-P, Link-H, Cisco and Lucent respectively. All the WNICs were external (PCMCIA based) except the Intel, which was an internal WNIC.

Table 1. WNICs profiled and the drivers used

| WNIC | Driver |
|------|--------|
| Airlink AWLC4030 | Madwifi ver. 0.9.2. |
| D-Link Air DWL-650 | Madwifi ver. 0.9.2. |
| Intel PRO/Wireless 2915ABG | IPW2200 ver. 1.1.2. |
| Linksys WPC11 | Prism2_cs |
| Linksys WPC11 | Host AP ver. 0.4.9 |
| Cisco Aironet 350 | Airo_cs |
| Lucent Orinoco Gold PC24E-H-FC | Orinoco_cs |

As noticed in Table - 1, we performed two sets of profiling for Linksys WPC11 using two different drivers. Also, Airlink and D-Link were profiled using the same Madwifi driver. Both of these WNICs use different chipsets (supports 802.11b/g/SuperG and 802.11b respectively) made by the same manufacturer, Atheros. Our goal was to examine two scenarios: 1) the effect of change in drivers on the same hardware; and 2) the effect of change in hardware (even when having a common manufacturer but different chipsets), keeping the same driver. The goal was to understand how different permutations of hardware and software configurations affect the behavior of the active scanning process.

# CHAPTER 6 – EXPERIMENTAL RESULTS

In this chapter, we examine the data generated from our experiments. This data was statistically analyzed using the MATLAB, mainly focusing on the following: 1) channels receiving the first probe request frame; 2) the number of PRFs; 3) burstiness of PRFs; 4) sequence/order of PRFs; and 5) dwell time with respect to the channel number. As a part of this chapter, we include the inferences from the experiments which meet the motivation and objective for this thesis research work.

## 6.1 - Channels Receiving the 1st Probe Request Frame
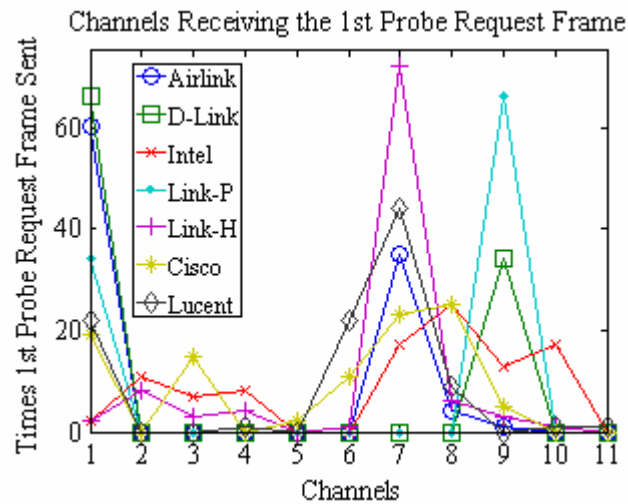


Figure 3. Channels receiving the 1st PRF (All channels - 100 trials)

A widely held belief is that active scanning starts from channel 1 [15, 17, 18]. We found no experimental proof to validate this assumption. However, it was observed during all the 100 trials for all the WNICs profiled that there is no specific channel for any WNIC from which the scanning starts. Figure 3 shows the number of times the 1$^{st}$ PRF was sent on any of the 11 channels for all the 100 trials for each WNIC profiled.

Summarizing the 100 trials for channel 1, Airlink in 60 trials sent the 1$^{st}$ PRF on channel 1, D-Link in 66 trials, Link-P, Cisco and Lucent sent in 19-34 trials and Intel and Link-H sent in 2 trials only. The channel 6 only received 1st PRF from Link-H, Cisco and Lucent WNICs. The least favored channel for the 1$^{st}$ PRF was channel 11 where none of the WNICs except Lucent (except for one trial) sent the 1$^{st}$ PRF. For channel 5 only the Cisco WNIC sent the 1$^{st}$ PRF in 2 trials. No other WNIC in any of the 100 trials sent the 1$^{st}$ PRF on this channel. Similar state was for channel 2, 3, 4, and 10. Clearly there was no single channel that received the majority of 1$^{st}$ PRF from all the WNICs. However, the combination of channels 1, 7 and 9 received nearly 75 percent of the 1$^{st}$ PRFs. If an AP is set to one of these channels, it will reduce the scanning delays during the initial connection.

Also, we found no evidence that scanning is sequential in nature. That is, it does not probe the channels in an increasing order number.

These findings could be very important when APs are being setup. In a wireless network, APs are normally setup on channels 1, 6 and 11, often called the three non overlapping channels because they theoretically have minimum interference with each other. Our analysis illustrates that configuring APs to operate on these channels will increase the time required for scanning and associating with an AP. Channel 6 received very few 1$^{st}$ PRFs and channel 11 received only a single 1$^{st}$ PRF from Lucent, among all the WNICs we profiled during the 100 trials. Thus, to

decrease the active scanning delays and the network traffic due to these management frames, the active scanning algorithm should start probing on the channels where APs are most likely to be deployed. Selective active scanning can be a method to achieve this [15, 29, 30].

## 6.2 - Number of Probe Request Frames

Table 2. Number of PRFs and their confidence percentage (All WNICs - 100 trials)

| WNIC | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | | 11 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ~n | % | ~n | % | ~n | % | ~n | % | ~n | % | ~n | % | ~n | % | ~n | % | ~n | % | ~n | % | ~n | % |
| Airlink | 591 | 94 | 641 | 64 | 641 | 71 | 739 | 96 | 739 | 91 | 986 | 73 | 838 | 83 | 739 | 85 | 591 | 96 | 443 | 88 | 345 | 80 |
| | 542 | 3 | 591 | 35 | 690 | 28 | 789 | 2 | 690 | 8 | 937 | 27 | 789 | 17 | 740 | 15 | 642 | 4 | 493 | 12 | 394 | 20 |
| Dlink | 168 | 84 | 168 | 86 | 168 | 86 | 168 | 85 | 168 | 87 | 168 | 85 | 168 | 97 | 168 | 100 | 168 | 100 | 168 | 100 | 168 | 100 |
| | 111 | 14 | 111 | 13 | 111 | 13 | 111 | 13 | 111 | 13 | 111 | 15 | 169 | 3 | | | | | | | | |
| Intel | 1844 | 63 | 2233 | 72 | 2816 | 80 | 2963 | 62 | 2720 | 62 | 3350 | 64 | 3156 | 46 | 2817 | 55 | 2622 | 42 | 2329 | 53 | 1554 | 52 |
| | 1796 | 34 | 2282 | 19 | 2767 | 13 | 2914 | 24 | 2769 | 21 | 3302 | 32 | 3205 | 33 | 2865 | 30 | 2671 | 42 | 2282 | 19 | 1505 | 47 |
| Link-P | 168 | 99 | 168 | 99 | 168 | 99 | 168 | 99 | 168 | 99 | 168 | 99 | 168 | 100 | 168 | 100 | 168 | 100 | 168 | 100 | 168 | 100 |
| | 191 | 1 | 189 | 1 | 189 | 1 | 183 | 1 | 169 | 1 | 111 | 1 | | | | | | | | | | |
| Link-H | 1223 | 88 | 1116 | 79 | 957 | 53 | 1063 | 95 | 1063 | 67 | 1276 | 95 | 1435 | 77 | 1329 | 71 | 1010 | 89 | 744 | 70 | 584 | 74 |
| | 1276 | 9 | 1063 | 16 | 904 | 47 | 1010 | 4 | 1010 | 32 | 1223 | 4 | 1382 | 22 | 1276 | 28 | 957 | 5 | 691 | 29 | 638 | 25 |
| Cisco | 548 | 80 | 822 | 74 | 766 | 51 | 876 | 84 | 876 | 62 | 1041 | 82 | 932 | 76 | 1041 | 71 | 766 | 99 | 657 | 94 | 548 | 52 |
| | 492 | 19 | 766 | 26 | 825 | 49 | 821 | 14 | 932 | 37 | 986 | 14 | 876 | 23 | 986 | 28 | 658 | 1 | 712 | 4 | 493 | 48 |
| Lucent | 111 | 99 | 111 | 71 | 111 | 100 | 111 | 99 | 111 | 99 | 168 | 41 | 168 | 100 | 111 | 99 | 111 | 100 | 55 | 67 | 55 | 100 |
| | 149 | 1 | 55 | 28 | | | 145 | 1 | 169 | 1 | 111 | 59 | | | 168 | 1 | | | 112 | 33 | | |

The number of PRFs sent on each channel is another parameter which can help profile the scanning behavior of WNICs. Table - 2 shows the number of PRFs and their confidence percentage when put through 100 trials. Each PRF (~n) may include a range of ±2 PRFs. To further explain the table, if we examine the channel 1 for Airlink WNIC, we can deduce that 591 ±2 PRFs were sent in 94 trials. And another 542 ±2 PRFs were sent in 3 trials on this channel.

The table highlights the accuracy of results using the number of PRFs as a parameter for profiling the active scanning algorithm.
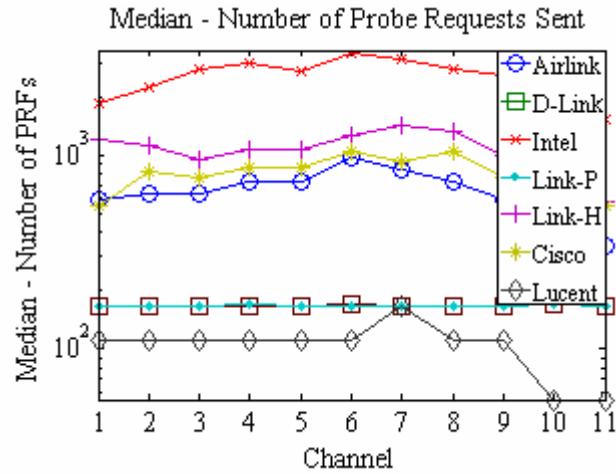


Figure 4(a). Median - Number of PRFs (All channels - 100 trials - log scale)
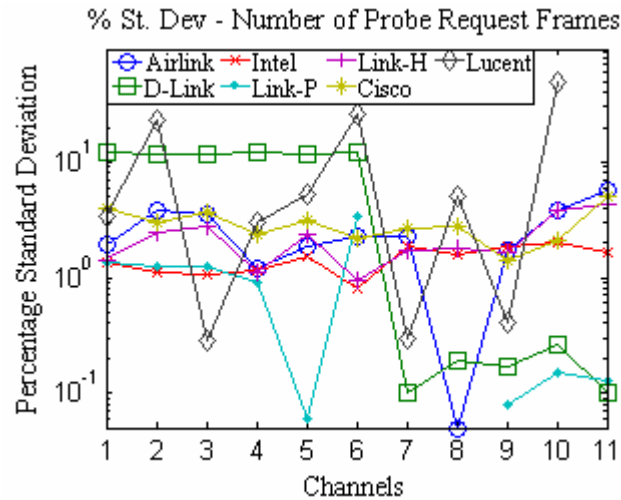


Figure 4(b).  Percentage Standard Deviation of number of PRFs (log scale)

Figure 4(a) displays the median number of PRFs on each channel. Figure 4(b) plots the percentage of standard deviation in the number of PRFs for all trials. The standard deviation plot

reveals that the number of PRFs sent across different trials is stable. All WNICs (except Lucent and D-Link) had less than 3% standard deviation across all trials for all channels. For channels where D-Link and Lucent exceeded 3% standard deviation, the number of PRFs fluctuated between two distinct values. For example, on channels 1 through 6, D-Link fluctuated between 111 or 168 PRFs per trial, yet 75-84% of the trials sent 168 PRFs on these channels.

For all the WNICs profiled, we observed that channel 6 received the maximum or close to the maximum number of PRFs, asserting the inclination of finding an AP on channel 6, though it received very less number of 1st PRFs.

While most of the WNICs sent a different number of probes per channel, 2 WNICs probed all channels equally (D-Link and Link-P). Lucent probed channels 1-6, 8 and 9 equally, sending 111 PRFs. Channel 7 received 168 frames and channels 10 and 11 each received 55 PRFs. The scanning algorithm of the Intel WNIC was much more aggressive than the other WNICs, sending 2.5 times more PRFs than the next highest WNIC, Link-P. Compared to the WNIC sending the least number of PRFs (Lucent) on channel 6, Intel sent nearly 25 times more PRFs. When the Linksys WNIC is used with the Host AP driver (Link-H), the WNIC behaves more aggressively sending 2 to 6 times more PRFs per channel. When the Linksys WNIC is used with the Prism driver (Link-P), the WNIC sends an equal number of PRFs across all channels. From this scenario we can infer that the scanning algorithm is highly influenced by the driver software. The reason for this assumption is that the Host AP driver can be configured to make the WNIC behave as an AP. It provides configuration to make it behave in managed (host mode) as well as master mode (AP mode). Such configuration may directly result in tweaking the active scanning behavior, as previously observed.

When comparing Airlink and D-Link, which are two WNICs with chipsets from the same manufacturer (Atheros) that used the same driver (MadWifi), we also noted distinctive behavior. The Airlink WNIC sent 4 to 8 times more PRFs per channel, while the D-Link WNIC sent a constant number of PRFs across all channels. The differences could be attributed to the fact that the chipset of each WNIC are different versions or the WNIC vendor imposed there own limitations on the scanning process.

We also noticed an unexpected observation between two WNICs. The D-Link and Link-P WNICs behave almost identically sending a constant number of PRFs across all channels, despite the fact that the WNICs are based on two different chipsets and used different drivers. This unique observation warrants further investigation as part of our future work to explain this behavior.

The statistics regarding the number of PRFs varied greatly across the set of WNICs we analyzed. Some WNICs were more aggressive in the number of PRFs sent. Some WNICs exhibited a steady scanning algorithm probing different channels equally, while other scanning algorithms favored certain channels. The analysis also illustrates the impact that the hardware and driver software combination has on the number of PRFs.

## 6.3 - Burstiness of Probe Request Frames

Burstiness can be defined as a peculiar nature of the active scanning algorithm, when it probes the channel more than once, without probing any other channel in between.

Burstiness can be subcategorized as follows:

1) Burstiness when scanning starts, which is, if more than one PRF is sent on the first channel it

   dwells on, without probing any other channel in between.

2) Burstiness after scanning starts, sending more than one PRF on a given channel, during the

   complete trial.

It was interesting to observe that the Intel WNIC behaved very distinctly from the other WNICs. All the other WNICs exhibited no burstiness (sent one PRF on a channel) or at times sent two or more PRFs on a particular channel. Whereas, the Intel WNIC displayed a higher degree of burstiness for the above two sub categories. Intel was the only WNIC which in 70% of the trials sent burst of PRFs ranging from 2 -19 when it sent the $1^{st}$ PRF. Unlike the other WNIC it continued sending more than one PRF when dwelling on any channel, which was quite commonly observed for this WNIC.

## 6.4 - Sequence/ Order of Probe Request Frames0

The order of the channels probed is unique to every active scanning algorithm. Among all the WNICs profiled, 2 WNICs showed a non random order of probing the channels. The first WNIC was the D-Link, which always cyclically probed the channels in the following sequence of channel numbers: 1,5,2,6,3,4,9,10,11,8.

The second WNIC which demonstrated a static sequence of probing the channels was Link-P. The WNIC always probed in the following sequence or in a sequence quite similar to: 1,5,2,6,3,4,9,10,7,11,8. The rest of the WNICs followed a pseudo random probing sequence

which needs our further investigation. Undoubtedly, the order of probing for each WNIC is unique, which can act as a very useful parameter for distinction of various WNICs.

## 6.5 - Dwell time with respect to Channel Number

The dwell time is defined as the amount of time spent by a WNIC on a channel. Dwell time between two probes is calculated by subtracting the arrival timestamp of the former PRF from the later PRF. By taking the channel number of the PRF into account, the dwell time on each channel can be calculated. Figure 4(c) shows the median dwell time for all the WNICs on each of the channel.
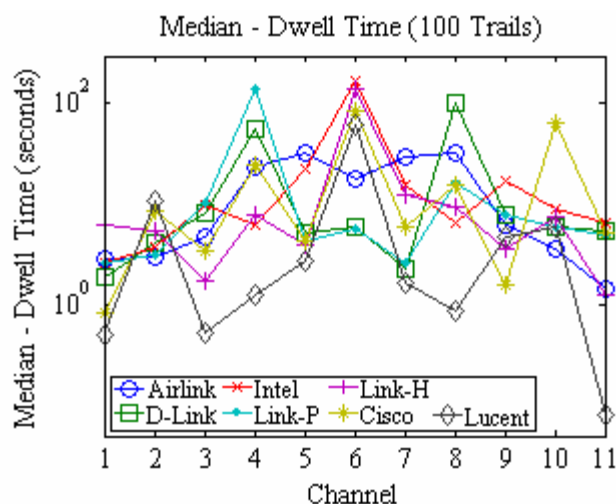


Figure 4(c). Median Dwell Time for PRFs (log scale)

An interesting observation was that the dwell time varied for each channel and each WNIC, i.e. the MinChannelTime was found to be channel specific. Another observation was that almost all the WNICs dwelled a substantial amount of time scanning on channel 6, reflected as

the peaks on channel 6 in Figure 4(c). We found it to be due to either of two reasons: 1) there were a larger number of PRFs on a particular channel, thereby increasing the dwell time; or 2) the WNIC actually dwelled longer on a particular channel before scanning the next channel. One hypothesis is that the active scanning algorithm keeps cycling back to a particular channel(s), expecting some AP activity on it. For example, Intel had a high dwell time on channel 6, even though it sent almost the same number of PRFs as on channel 7. The dwell time on channel 6 was close to 11 times more than that on channel 7.

# CHAPTER 7 – DISTINGUISHING WNICS USING PRF STATISTICS

Table 3. Various statistical characteristics of Intel, Link-P and Lucent WNICs

| Channel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---------|---|---|---|---|---|---|---|---|---|----|----|
| **1st PRF Sent** | | | | | | | | | | | |
| **Intel** | 2 | 11 | 7 | 8 | 0 | 0 | 17 | 25 | 13 | 17 | 0 |
| **Link - P** | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 0 | 0 |
| **Lucent** | 22 | 0 | 0 | 1 | 0 | 22 | 44 | 9 | 0 | 1 | 1 |
| **Median Number of PRF** | | | | | | | | | | | |
| **Intel** | 1845 | 2234 | 2816 | 2962 | 2720 | 3350 | 3157 | 2817 | 2622 | 2331 | 1553 |
| **Link - P** | 168 | 168 | 168 | 169 | 168 | 168 | 168 | 168 | 168 | 169 | 168 |
| **Lucent** | 111 | 112 | 111 | 111 | 111 | 111 | 168 | 111 | 111 | 55 | 55 |
| **Median Dwell Time (seconds)** | | | | | | | | | | | |
| **Intel** | 2.65 | 3.85 | 9.79 | 6.30 | 23 | 167 | 15.3 | 6.66 | 17.1 | 9.14 | 6.42 |
| **Link - P** | 2.62 | 3.16 | 10.5 | 143 | 4.44 | 5.77 | 2.59 | 16.5 | 8.00 | 5.99 | 4.97 |
| **Lucent** | 0.51 | 10.6 | 0.53 | 1.26 | 2.78 | 62.4 | 1.66 | 0.86 | 4.69 | 5.92 | 0.08 |

In this chapter, we demonstrate how some of the parameters obtained from profiling active scanning algorithms can be used to distinguish WNICs. The ability to passively profile a WNIC and within the first few seconds or even less than that (when it starts scanning for APs), can be very useful to the field of wireless network security. As mentioned previously in chapter 1, this information can help us identify a rogue host from authenticated hosts. A point worth mentioning is that by using such a scheme, a WNIC can be identified in the shortest amount of time from the signature list of the WNICs previously profiled, as it has been demonstrated earlier [12, 13]. Practically speaking, a rogue host can be identified even before it starts communicating any application layer packets. Such kind of distinction between the hosts can be achieved at the MAC Layer, preventing the data to be sent or received from the higher TCP/IP layers.

We randomly choose three WNICs; Intel, Link-P and Lucent and use the parameters in Table - 3 to distinguish them. The results are quite interesting when various characterizing parameters are combined. We notice that the channel on which the $1^{st}$ PRF is sent by the three WNICs to be very distinctive. For example, Intel was the only WNIC which also received the $1^{st}$ PRF on channels 2 and 3. If an IDS is sniffing on these channels, it can clearly ascertain that the Intel WNIC has started scanning for APs. This parameter can act as a quickest method which can help distinguish WNICs. Such a distinction is hard to achieve if sniffing is limited to selective channels only [12, 13].

There are some channels which receive the $1^{st}$ PRF for two or more WNICs. In such a case, we can look at the number of PRFs sent on those channels. Clearly the median value for number of PRF for Intel on all channels is too large. Compared to Link-P or Lucent. Even the values for Link-P are modestly always larger than the Lucent. We confirmed that the median values are good indicator by calculating the confidence of these median values, which were found to be particularly large. We observed that just by using two parameters we were able to pinpoint the WNIC used. A faster and guaranteed distinction can be achieved by looking at all the parameters which includes the burstiness, sequence of probing and dwell time. The theoretically possible identification of a WNIC can be achieved by examining the $1^{st}$ PRF or waiting for the first few PRFs. Together with the dwell time, and looking at its burstiness, an IDS can act faster to find out the identity of the WNIC used by any attacker.

# CHAPTER 8 – CONCLUSION

In this thesis report we have shown the importance of characterizing active scanning algorithms of various WNICs. We have shown how this information based on characterization can be of significant importance to several related fields, mainly wireless network security, link layer handovers, AP deployment, wireless network simulations, etc.

We have empirically proved that scanning does not always start on channel 1, is not sequential, and contains a significant amount of variation depending on the WNIC chipset and driver used. Also, we showed that there is no correlation between the channels where access points are commonly deployed (1, 6, and 11), and the channels that are favored by the scanning algorithms.

We further find that the number of PRFs sent per WNIC and on each channel were unique with channel 6 being the most popular for the majority of the WNICs. Intel sent the most probes overall and showed a bursty nature. We also show our discovery of the algorithm/ order of probing the channels for two WNICs, which is a parameter that can be used for further distinction.

Also, we showed that the dwell time for each WNIC on each channel is channel, WNIC and driver specific. Some WNICs had a significantly higher dwell time on particular channels because either they sent more PRFs on that channel or because the WNIC kept cycling back to these channels repeatedly.

Finally, we demonstrate how our approach can be used to effectively identify a rogue host in a wireless network. We empirically show this distinction between WNICs of various manufacturers and validate the efficacy of our approach, drawing comparisons with the previously known approaches.

# CHAPTER 9 – FUTURE WORK

As a part of the proposed future work, we are currently attempting to further describe the active scanning algorithm, both quantitatively and qualitatively. Proposed future work can be broken down into the following: 1) we wish to decode the sequence of channels probed (algorithm) for the rest of the WNICs; 2) we wish to find the periodicity of these active scanning algorithms studying the temporal behavior using signal processing as a tool to provide a real time rogue host detection scheme; and 3) we wish to examine the behavior of the active scanning algorithm when associated with an AP.

Our initial finding show that some WNICs tend to associate with an AP even before the WNIC interface is brought up (using Linux tool *ifconfig*). Another finding is that after being associated with an AP, a WNIC only probes for an AP when the signal strength of the AP degrades below a certain threshold. The probing was also found to be less rigorous, compared to when it initially scans for an AP. We wish to further examine phenomenon like these and profile the behavior of active scanning algorithms in such conditions.

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**APPENDIX A: RADIOTAP HEADER AND MONITOR MODE**

This appendix contains the structure of the radiotap header and the fields in it. It also contains the snapshots of a typical trace file and the radiotap header using the *wireshark* utility. Another snapshot shows the output from the *iwconfig* tool from Linux, highlighting the details of the wireless interface in monitor mode.

**Radiotap Header Structure**

```
struct ieee80211_radiotap_header {
    u_int8_t    it_version;    /* set to 0 */
    u_int8_t    it_pad;
    u_int16_t   it_len;        /* entire length */
    u_int32_t   it_present;    /* fields present */
} __attribute__((__packed__));
```

**Supported list of radiotap header fields**

```
enum ieee80211_radiotap_type {
    IEEE80211_RADIOTAP_TSFT = 0,
    IEEE80211_RADIOTAP_FLAGS = 1,
    IEEE80211_RADIOTAP_RATE = 2,
    IEEE80211_RADIOTAP_CHANNEL = 3,
    IEEE80211_RADIOTAP_FHSS = 4,
    IEEE80211_RADIOTAP_DBM_ANTSIGNAL = 5,
    IEEE80211_RADIOTAP_DBM_ANTNOISE = 6,
    IEEE80211_RADIOTAP_LOCK_QUALITY = 7,
    IEEE80211_RADIOTAP_TX_ATTENUATION = 8,
    IEEE80211_RADIOTAP_DB_TX_ATTENUATION = 9,
    IEEE80211_RADIOTAP_DBM_TX_POWER = 10,
    IEEE80211_RADIOTAP_ANTENNA = 11,
    IEEE80211_RADIOTAP_DB_ANTSIGNAL = 12,
    IEEE80211_RADIOTAP_DB_ANTNOISE = 13,
    IEEE80211_RADIOTAP_FCS = 14,
    IEEE80211_RADIOTAP_EXT = 31  };
```

**Wireshark Snapshot for a typical capture trace**

**Radiotap Header as viewed in *wireshark***

```
⊞ Frame 1 (67 bytes on wire, 67 bytes captured)
⊟ Radiotap Header v0, Length 25
    Header revision: 0
    Header pad: 0
    Header length: 25
    Present flags (0x0000086f)
    MAC timestamp: 1516027548868280320
    Preamble: Long (0)
    FCS: False (0)
    DATAPAD: False (0)
    Data Rate: 1.0 Mb/s
    Channel: 2437 (chan 6)
    Channel type: 802.11b (0x00a0)
    SSI Signal: -24 dBm
    SSI Noise: 0 dBm
    Antenna: 1
⊞ IEEE 802.11
⊞ IEEE 802.11 wireless LAN management frame

0000  00 00 19 00 6f 08 00 00  00 00 00 00 06 03 0a 15
0010  00 02 85 09 a0 00 e8 00  01 40 00 00 00 ff ff ff
0020  ff ff ff 00 16 6f 60 ec  60 ff ff ff ff ff ff c0
0030  3f 00 00 01 08 82 84 0b  16 0c 12 18 24 32 04 30
0040  48 60 6c
```

**Tool *iwconfig* showing the eth1 interface in monitor mode on channel 5**

```
[root@localhost ~]# iwconfig
eth1      unassociated  ESSID:off/any  Nickname:"localhost.localdomain"
          Mode:Monitor  Frequency=2.432 GHz  Access Point: 00:00:00:00:00:00
          Bit Rate:0 kb/s    Tx-Power=20 dBm    Sensitivity=8/0
          Retry limit:7    RTS thr:off    Fragment thr:off
          Encryption key:3671-All3-A0    Security mode:open
          Power Management:off
          Link Quality:0  Signal level:0  Noise level:0
          Rx invalid nwid:0  Rx invalid crypt:0  Rx invalid frag:0
          Tx excessive retries:0  Invalid misc:563    Missed beacon:0

rtap0     no wireless extensions.
```

## APPENDIX B: CHANNELS RECEIVING THE 1$^{ST}$ PROBE REQUEST FRAME

This appendix shows the channels which receive the 1$^{st}$ probe request frame in a tabular format, specific to each wireless network interface card.

**Channels Receiving the 1$^{st}$ Probe Request Frame**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| **Airlink** | 60 | 0 | 0 | 0 | 0 | 0 | 35 | 4 | 1 | 0 | 0 | 100 |
| **Dlink** | 66 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 | 0 | 0 | 100 |
| **Intel** | 2 | 11 | 7 | 8 | 0 | 0 | 17 | 25 | 13 | 17 | 0 | 100 |
| **Linksys - Prism** | 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66 | 0 | 0 | 100 |
| **Linksys - HAP** | 2 | 8 | 3 | 4 | 0 | 1 | 72 | 6 | 3 | 1 | 0 | 100 |
| **Cisco** | 19 | 0 | 15 | 0 | 2 | 11 | 23 | 25 | 5 | 0 | 0 | 100 |
| **Lucent** | 22 | 0 | 0 | 1 | 0 | 22 | 44 | 9 | 0 | 1 | 1 | 100 |
| | | | | | | | | | | | | |
| Total | **205** | 19 | 25 | 13 | 2 | 34 | **191** | 69 | **122** | 19 | 1 | |

**APPENDIX C: NUMBER OF PROBE REQUEST FRAME STATISTICS**

This appendix contains tables showing the total number, median and the average number of probes request frames on each channel, for all wireless network interface cards.

**Statistics Showing the Total, Median and Average Number of Probe Request Frames**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| **Airlink** | 59071 | 62358 | 65548 | 73978 | 73547 | 97306 | 83029 | 73915 | 59304 | 44909 | 35490 | 728455 |
| Median | 591 | 641 | 641 | 739 | 739 | 986 | 839 | 739 | 591 | 443 | 345 | |
| Average | 590 | 623 | 655 | 739 | 735 | 973 | 830 | 739 | 593 | 449 | 354 | |
| | | | | | | | | | | | | |
| **D-Link** | 16019 | 16075 | 16076 | 16043 | 16059 | 16016 | 16803 | 16811 | 16809 | 16874 | 16803 | 180388 |
| Median | 168 | 168 | 168 | 168 | 168 | 169 | 168 | 168 | 168 | 169 | 168 | |
| Average | 160 | 160 | 160 | 160 | 160 | 160 | 168 | 168 | 168 | 168 | 168 | |
| | | | | | | | | | | | | |
| **Intel** | 182957 | 223889 | 280956 | 295488 | 271937 | 333421 | 315903 | 283513 | 263375 | 234131 | 152997 | 2838567 |
| Median | 1845 | 2234 | 2816 | 2962 | 2720 | 3350 | 3157 | 2817 | 2622 | 2331 | 1553 | |
| Average | 1829 | 2238 | 2809 | 2954 | 2719 | 3334 | 3159 | 2835 | 2633 | 2341 | 1529 | |
| | | | | | | | | | | | | |
| **Link-P** | 16823 | 16821 | 16821 | 16868 | 16801 | 16788 | 16800 | 16800 | 16802 | 16893 | 16803 | 185020 |
| Median | 168 | 168 | 168 | 169 | 168 | 168 | 168 | 168 | 168 | 169 | 168 | |
| Average | 168 | 168 | 168 | 168 | 168 | 167 | 168 | 168 | 168 | 168 | 168 | |
| | | | | | | | | | | | | |
| **Link-H** | 122675 | 110361 | 93225 | 106147 | 104636 | 127464 | 142452 | 131437 | 101000 | 73009 | 59860 | 1172266 |
| Median | 1223 | 1116 | 957 | 1063 | 1063 | 1276 | 1435 | 1329 | 1010 | 744 | 584 | |
| Average | 1226 | 1103 | 932 | 1061 | 1046 | 1274 | 1424 | 1314 | 1010 | 730 | 598 | |
| | | | | | | | | | | | | |
| **Cisco** | 53661 | 80731 | 79352 | 86853 | 89737 | 103539 | 91753 | 102416 | 76529 | 65807 | 52120 | 882498 |
| Median | 547 | 821 | 767 | 876 | 876 | 1041 | 931 | 1041 | 766 | 657 | 547 | |
| Average | 536 | 807 | 793 | 868 | 897 | 1035 | 917 | 1024 | 765 | 658 | 521 | |
| | | | | | | | | | | | | |
| **Lucent** | 11141 | 9593 | 11111 | 11135 | 11158 | 13467 | 16841 | 11157 | 11126 | 7381 | 5500 | 119610 |
| Median | 111 | 112 | 111 | 111 | 111 | 111 | 168 | 111 | 111 | 55 | 55 | |
| Average | 111 | 95 | 111 | 111 | 111 | 134 | 168 | 111 | 111 | 73 | 55 | |

**APPENDIX D: DWELL TIME STATISTICS**

The appendix shows the dwell time statistics for all the wireless network interface cards. Dwell time is the difference in the timestamps of two consecutive probe request frames. The two tables included show the total dwell time and the median dwell time for all 100 trials.

**Total Dwell Time**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| Airlink | 307.39 | 640.73 | 1089.2 | 3534.1 | 4326.9 | 2058.3 | 2890.8 | 4166 | 2338.7 | 2201.6 | 157.78 | 23711.5 |
| Dlink | 196.12 | 403.21 | 872.16 | 6510 | 521.64 | 629 | 234.28 | 9849.2 | 751.92 | 615.11 | 536.45 | 21119.1 |
| Intel | 300.14 | 430.14 | 1088.2 | 718.26 | 1959 | 16259 | 1540.1 | 669 | 2176.4 | 3142 | 1698 | 29980.2 |
| Link-P | 268.92 | 308.56 | 985.39 | 12311 | 426.65 | 583.9 | 237.81 | 4373 | 719.78 | 607.2 | 473.32 | 21295.5 |
| Link-H | 689.52 | 696 | 223.61 | 752.25 | 1082.9 | 13143 | 1932.3 | 1507.1 | 561.29 | 2112.5 | 298.23 | 22998.7 |
| Cisco | 111.07 | 970.8 | 363.81 | 2414.3 | 479.03 | 8449 | 639.03 | 1819.7 | 231.07 | 6378.4 | 1825.6 | 23681.8 |
| Lucent | 472.78 | 1791.5 | 546.55 | 1792.9 | 1599.4 | 6412.9 | 1577.7 | 1050 | 2821.2 | 4521.4 | 109.96 | 22696.3 |

**Median Dwell Time**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| Airlink | 2.82 | 2.98 | 4.66 | 23.29 | 32.83 | 17.64 | 30.20 | 32.21 | 6.35 | 3.54 | 1.43 |
| Dlink | 1.91 | 4.07 | 8.27 | 56.79 | 5.27 | 5.89 | 2.28 | 102.50 | 7.88 | 5.99 | 5.47 |
| Intel | 2.65 | 3.85 | 9.79 | 6.30 | 23.02 | 167.61 | 15.36 | 6.66 | 17.17 | 9.14 | 6.42 |
| Link-P | 2.62 | 3.16 | 10.56 | 143.53 | 4.44 | 5.77 | 2.59 | 16.58 | 8.00 | 5.99 | 4.97 |
| Link-H | 6.38 | 5.53 | 1.73 | 7.97 | 3.92 | 140.68 | 12.65 | 9.39 | 3.60 | 7.36 | 1.25 |
| Cisco | 0.83 | 8.82 | 3.39 | 24.76 | 4.43 | 85.42 | 5.94 | 15.59 | 1.56 | 66.05 | 5.19 |
| Lucent | 0.51 | 10.66 | 0.53 | 1.26 | 2.78 | 62.45 | 1.66 | 0.86 | 4.69 | 5.92 | 0.08 |

**APPENDIX E: NUMBER OF PROBE REQUEST FRAMES vs. CONFIDENCE**

The following appendix shows the number of probe request frames and its confidence percentage. Confidence percentage describes the number of times, the same numbers of probe request frames are sent in 100 trials. We also show the average, maximum, minimum and standard deviation of the number of probe request frames across all the channels, for all the wireless network interface cards.

**Percentage Confidence, Minimum, Maximum and Standard Deviation of Probe Request Frames**

| Airlink | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Channels** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % |
| | 542 3 | 591 35 | 641 71 | 690 1 | 690 8 | 937 24 | 789 15 | 739 85 | 591 96 | 443 88 | 345 80 |
| | 591 92 | 627 1 | 690 11 | 739 89 | 739 70 | 938 3 | 790 2 | 740 15 | 642 4 | 493 3 | 394 10 |
| | 592 2 | 641 42 | 691 17 | 740 7 | 740 21 | 986 47 | 838 23 | | | 494 9 | 395 10 |
| | 606 1 | 642 22 | 700 1 | 758 1 | 757 1 | 987 26 | 839 60 | | | | |
| | 641 1 | | | 789 1 | | | | | | | |
| | 642 1 | | | 790 1 | | | | | | | |
| | | | | | | | | | | | |
| **Average** | 591 | 624 | 655 | 740 | 735 | 973 | 830 | 739 | 593 | 449 | 355 |
| **Max** | 642 | 642 | 700 | 790 | 757 | 987 | 839 | 740 | 642 | 494 | 395 |
| **Min** | 542 | 591 | 641 | 690 | 690 | 937 | 789 | 739 | 591 | 443 | 345 |
| **St. Dev.** | 11.25 | 24.07 | 22.79 | 8.88 | 13.60 | 21.98 | 18.73 | 0.36 | 10.04 | 16.58 | 19.90 |

| D-Link | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Channels** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % |
| | 111 14 | 111 13 | 111 13 | 111 12 | 111 13 | 111 4 | 168 97 | 168 89 | 168 91 | 168 26 | 168 97 |
| | 168 84 | 168 86 | 168 84 | 112 2 | 168 87 | 112 11 | 169 3 | 169 11 | 169 9 | 169 74 | 169 3 |
| | 169 1 | 184 1 | 169 2 | 168 62 | | 168 25 | | | | | |
| | 184 1 | | 183 1 | 169 23 | | 169 60 | | | | | |
| | | | | 184 1 | | | | | | | |
| | | | | | | | | | | | |
| **Average** | 160 | 161 | 161 | 160 | 161 | 160 | 168 | 168 | 168 | 169 | 168 |
| **Max** | 184 | 184 | 183 | 184 | 168 | 169 | 169 | 169 | 169 | 169 | 169 |
| **Min** | 111 | 111 | 111 | 111 | 111 | 111 | 168 | 168 | 168 | 168 | 168 |
| **St. Dev.** | 20.01 | 19.39 | 19.39 | 20.05 | 19.27 | 20.45 | 0.17 | 0.31 | 0.29 | 0.44 | 0.17 |

| Intel | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Channels** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % |
| | 1796 17 | 2185 7 | 2622 1 | 2767 1 | 2476 1 | 3253 2 | 2722 1 | 2575 1 | 2428 1 | 2233 1 | 1457 1 |
| | 1797 17 | 2186 1 | 2719 1 | 2913 5 | 2574 1 | 3301 7 | 3059 2 | 2767 2 | 2477 1 | 2282 16 | 1505 47 |
| | 1843 1 | 2229 1 | 2767 7 | 2914 15 | 2622 1 | 3302 20 | 3107 2 | 2768 3 | 2524 1 | 2283 3 | 1553 16 |
| | 1844 3 | 2233 31 | 2768 6 | 2915 4 | 2671 10 | 3303 4 | 3108 12 | 2816 23 | 2525 5 | 2329 1 | 1554 23 |
| | 1845 47 | 2234 41 | 2815 1 | 2962 28 | 2672 2 | 3304 1 | 3109 3 | 2817 27 | 2573 3 | 2330 16 | 1555 13 |
| | 1846 13 | 2281 3 | 2816 50 | 2963 30 | 2718 2 | 3349 1 | 3155 4 | 2818 5 | 2574 2 | 2331 32 | |
| | 1893 1 | 2282 10 | 2817 27 | 2964 4 | 2719 13 | 3350 21 | 3156 17 | 2864 3 | 2621 2 | 2332 4 | |
| | 1895 1 | 2283 5 | 2818 2 | 2970 1 | 2720 42 | 3351 31 | 3157 24 | 2865 19 | 2622 35 | 2378 5 | |
| | | 2284 1 | 2865 3 | 3010 2 | 2721 7 | 3352 11 | 3158 1 | 2866 6 | 2623 5 | 2379 6 | |
| | | | 2866 1 | 3011 6 | 2768 9 | 3400 2 | 3204 3 | 2867 2 | 2670 20 | 2381 1 | |
| | | | 2867 1 | 3012 4 | 2769 11 | | 3205 18 | 2913 2 | 2671 17 | 2427 7 | |
| | | | | | 2770 1 | | 3206 12 | 2914 5 | 2672 5 | 2428 5 | |
| | | | | | | | 3254 1 | 2915 2 | 2720 3 | 2429 2 | |
| | | | | | | | | | | 2476 1 | |
| | | | | | | | | | | | |
| **Average** | 1830 | 2239 | 2810 | 2955 | 2719 | 3334 | 3159 | 2835 | 2634 | 2341 | 1530 |
| **Max** | 1895 | 2284 | 2867 | 3012 | 2770 | 3400 | 3254 | 2915 | 2720 | 2476 | 1555 |
| **Min** | 1796 | 2185 | 2622 | 2767 | 2476 | 3253 | 2722 | 2575 | 2428 | 2233 | 1457 |
| **St. Dev.** | 24.82 | 24.81 | 29.45 | 34.45 | 41.28 | 27.12 | 58.18 | 44.09 | 49.39 | 47.51 | 25.53 |

**Link-P**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % |
| | 168 99 | 168 99 | 168 99 | 168 46 | 168 99 | 111 1 | 168 100 | 168 100 | 168 98 | 168 7 | 167 1 |
| | 191 1 | 189 1 | 189 1 | 169 53 | 169 1 | 168 54 | | | 169 2 | 169 93 | 168 95 |
| | | | | 183 1 | | 169 45 | | | | | 169 4 |
| | | | | | | | | | | | |
| Average | 168 | 168 | 168 | 169 | 168 | 168 | 168 | 168 | 168 | 169 | 168 |
| Max | 191 | 189 | 189 | 183 | 169 | 169 | 168 | 168 | 169 | 169 | 169 |
| Min | 168 | 168 | 168 | 168 | 168 | 111 | 168 | 168 | 168 | 168 | 167 |
| St. Dev. | 2.30 | 2.10 | 2.10 | 1.53 | 0.10 | 5.77 | 0.00 | 0.00 | 0.14 | 0.26 | 0.22 |

**Link-H**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % |
| | 1169 2 | 1010 4 | 904 47 | 1010 4 | 1010 32 | 1223 4 | 1382 22 | 1276 25 | 957 5 | 691 29 | 584 74 |
| | 1223 88 | 1063 12 | 957 37 | 1063 89 | 1063 42 | 1276 73 | 1435 45 | 1277 3 | 1008 1 | 744 59 | 638 8 |
| | 1224 1 | 1064 4 | 958 16 | 1064 6 | 1064 25 | 1277 22 | 1436 32 | 1318 1 | 1010 78 | 745 11 | 639 17 |
| | 1276 4 | 1116 60 | | 1116 1 | 1070 1 | 1330 1 | 1521 1 | 1329 42 | 1011 11 | 879 1 | 677 1 |
| | 1277 5 | 1117 19 | | | | | | 1330 29 | 1052 1 | | |
| | | 1126 1 | | | | | | | 1063 2 | | |
| | | | | | | | | | | | |
| Average | 1227 | 1104 | 932 | 1061 | 1046 | 1275 | 1425 | 1314 | 1010 | 730 | 599 |
| Max | 1277 | 1126 | 958 | 1116 | 1070 | 1330 | 1521 | 1330 | 1064 | 879 | 677 |
| Min | 1169 | 1010 | 904 | 1010 | 1010 | 1223 | 1382 | 1276 | 957 | 691 | 584 |
| St. Dev. | 17.48 | 27.38 | 26.74 | 11.81 | 25.08 | 11.89 | 24.26 | 24.01 | 16.60 | 28.49 | 25.04 |

**Cisco**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % |
| | 492 19 | 766 18 | 766 34 | 821 14 | 876 59 | 985 6 | 822 1 | 877 1 | 658 1 | 601 1 | 492 43 |
| | 536 1 | 767 8 | 767 17 | 822 1 | 877 3 | 986 7 | 876 22 | 985 7 | 766 62 | 602 1 | 493 4 |
| | 547 65 | 821 29 | 821 16 | 875 1 | 931 6 | 987 1 | 877 1 | 986 20 | 767 37 | 656 5 | 494 1 |
| | 548 13 | 822 37 | 822 26 | 876 60 | 932 28 | 1040 21 | 931 51 | 987 1 | | 657 86 | 547 12 |
| | 549 2 | 823 8 | 823 7 | 877 20 | 933 3 | 1041 47 | 932 24 | 1040 4 | | 658 3 | 548 26 |
| | | | | 878 3 | 941 1 | 1042 14 | 933 1 | 1041 37 | | 711 1 | 549 14 |
| | | | | 928 1 | | 1095 1 | | 1042 30 | | 712 2 | |
| | | | | | | 1096 1 | | | | 713 1 | |
| | | | | | | 1097 2 | | | | | |
| | | | | | | | | | | | |
| Average | 537 | 807 | 794 | 869 | 897 | 1035 | 918 | 1024 | 765 | 658 | 521 |
| Max | 549 | 823 | 823 | 928 | 941 | 1097 | 933 | 1042 | 767 | 713 | 549 |
| Min | 492 | 766 | 766 | 821 | 876 | 985 | 822 | 877 | 658 | 601 | 492 |
| St. Dev. | 21.75 | 24.43 | 27.88 | 20.70 | 27.39 | 22.92 | 25.27 | 29.12 | 10.85 | 13.54 | 28.08 |

**Lucent**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % | n % |
| | 111 96 | 55 28 | 111 89 | 111 98 | 111 99 | 111 59 | 168 59 | 111 99 | 111 74 | 55 67 | 55 100 |
| | 112 3 | 111 18 | 112 11 | 112 1 | 169 1 | 168 11 | 169 41 | 168 1 | 112 26 | 112 33 | |
| | 149 1 | 112 53 | | 145 1 | | 169 30 | | | | | |
| | | | | | | | | | | | |
| Average | 111 | 96 | 111 | 111 | 112 | 135 | 168 | 112 | 111 | 74 | 55 |
| Max | 149 | 119 | 112 | 145 | 169 | 169 | 169 | 168 | 112 | 112 | 55 |
| Min | 111 | 55 | 111 | 111 | 111 | 111 | 168 | 111 | 111 | 55 | 55 |
| St. Dev. | 3.80 | 25.67 | 0.31 | 3.40 | 5.80 | 28.54 | 0.49 | 5.70 | 0.44 | 26.94 | 0.00 |

**APPENDIX F: DWELL TIME ON EACH CHANNEL FOR ALL 100 TRIALS**

This appendix shows the dwell time for each wireless network interface card on each of the 11 channels, for all the 100 trials.

| Airlink | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Trial-1 | 5.2223 | 3.4 | 1.7096 | 35.604 | 84.673 | 25.745 | 18.686 | 7.6349 | 44.643 | 8.657 | 1.1202 |
| Trial-2 | 4.0094 | 2.0921 | 1.5342 | 23.946 | 50.083 | 18.512 | 31.829 | 17.256 | 75.35 | 8.2745 | 3.0494 |
| Trial-3 | 4.911 | 2.6614 | 2.0273 | 31.945 | 95.688 | 28.206 | 15.385 | 9.9658 | 42.349 | 4.1193 | 1.2589 |
| Trial-4 | 4.7744 | 3.9619 | 1.7015 | 35.313 | 105 | 37.647 | 12.519 | 6.1443 | 28.134 | 1.4951 | 1.4423 |
| Trial-5 | 4.3808 | 3.2495 | 1.9451 | 11.333 | 84.556 | 42.203 | 19.078 | 15.465 | 52.286 | 1.3533 | 0.63589 |
| Trial-6 | 4.0407 | 4.1247 | 1.2225 | 5.5115 | 120.42 | 67.145 | 7.6311 | 4.9963 | 17.6 | 2.7432 | 0.40973 |
| Trial-7 | 4.4155 | 3.0576 | 1.1682 | 4.4258 | 95.789 | 52.848 | 15.531 | 16.312 | 37.571 | 2.7327 | 0.61014 |
| Trial-8 | 4.5386 | 2.3972 | 4.2382 | 6.5619 | 108.89 | 58.814 | 11.391 | 7.3699 | 28.793 | 3.3461 | 0.55202 |
| Trial-9 | 4.0129 | 1.4125 | 2.5899 | 2.1649 | 26.956 | 22.401 | 42.883 | 31.267 | 97.852 | 3.4784 | 1.2518 |
| Trial-10 | 5.2747 | 1.2565 | 6.6873 | 7.036 | 114.42 | 58.718 | 13.466 | 6.6064 | 23.062 | 0.97283 | 0.56527 |
| Trial-11 | 4.0517 | 1.6176 | 5.6652 | 13.879 | 108.29 | 50.482 | 16.529 | 8.0961 | 27.552 | 1.0355 | 0.65292 |
| Trial-12 | 4.8168 | 1.2746 | 2.8782 | 37.502 | 124.19 | 35.438 | 7.0004 | 4.201 | 15.559 | 0.80594 | 0.7983 |
| Trial-13 | 6.5114 | 1.9089 | 1.8677 | 35.463 | 123.05 | 37.991 | 8.1971 | 5.6876 | 13.286 | 1.8176 | 0.9114 |
| Trial-14 | 4.4007 | 1.6013 | 2.1993 | 12.848 | 35.611 | 8.9214 | 36.786 | 26.109 | 102.2 | 5.5717 | 1.2373 |
| Trial-15 | 5.0123 | 1.6958 | 3.0203 | 34.711 | 104.85 | 32.155 | 13.945 | 12.192 | 26.001 | 2.3701 | 1.1365 |
| Trial-16 | 4.2502 | 1.9436 | 1.5227 | 44.386 | 129.53 | 36.179 | 4.9826 | 11.081 | 0.67803 | 1.5253 | 1.2093 |
| Trial-17 | 4.3633 | 1.5531 | 6.0253 | 13.421 | 34.134 | 8.7635 | 34.206 | 120.24 | 6.2452 | 3.9905 | 5.3693 |
| Trial-18 | 4.1649 | 1.0975 | 15.913 | 5.5322 | 26.006 | 10.321 | 35.067 | 122.94 | 7.2622 | 3.5526 | 1.553 |
| Trial-19 | 3.8858 | 1.1787 | 5.4934 | 8.6223 | 30.028 | 7.8969 | 39.716 | 130.63 | 5.7885 | 4.0532 | 1.216 |
| Trial-20 | 3.5583 | 0.93241 | 1.3944 | 7.3549 | 112.24 | 2.8007 | 19.325 | 83.777 | 3.7455 | 1.1668 | 2.2202 |
| Trial-21 | 2.7093 | 2.2617 | 1.9683 | 18.524 | 135.29 | 3.6396 | 1.4706 | 68.202 | 1.5443 | 0.62803 | 1.4502 |
| Trial-22 | 4.4405 | 1.1629 | 4.7677 | 32.613 | 83.966 | 23.256 | 18.55 | 58.819 | 3.2394 | 5.3782 | 1.7061 |
| Trial-23 | 3.5006 | 0.76883 | 2.4263 | 21.443 | 42.1 | 9.8578 | 33.591 | 112.9 | 4.3064 | 2.1243 | 5.4905 |
| Trial-24 | 1.9448 | 1.8022 | 1.1888 | 23.31 | 134.77 | 10.142 | 3.3031 | 52.962 | 2.714 | 3.4045 | 2.5472 |
| Trial-25 | 2.8879 | 0.7907 | 1.6733 | 23.269 | 65.769 | 18.177 | 30.509 | 86.049 | 2.2781 | 3.5342 | 1.9543 |
| Trial-26 | 2.6936 | 1.0375 | 1.0406 | 20.932 | 31.694 | 13.542 | 40.715 | 57.403 | 3.2418 | 61.755 | 1.7816 |
| Trial-27 | 2.7941 | 0.84088 | 3.363 | 24.406 | 63.24 | 23.657 | 28.59 | 34.233 | 6.4608 | 47.284 | 1.9157 |
| Trial-28 | 2.6744 | 1.2481 | 3.866 | 21.268 | 59.831 | 13.521 | 33.833 | 38.459 | 6.6247 | 55.806 | 1.8488 |
| Trial-29 | 2.961 | 0.69394 | 5.8456 | 23.716 | 55.378 | 14.129 | 33.446 | 41.187 | 2.3584 | 55.817 | 1.7505 |
| Trial-30 | 2.693 | 0.86344 | 3.5197 | 20.98 | 61.579 | 14.721 | 31.685 | 39.048 | 3.2425 | 54.048 | 1.6731 |
| Trial-31 | 2.9413 | 1.3395 | 5.3929 | 27.756 | 75.564 | 22.197 | 25.05 | 31.79 | 2.7379 | 38.931 | 1.6457 |
| Trial-32 | 3.5375 | 1.1751 | 8.7701 | 21.29 | 66.479 | 15.296 | 25.975 | 34.753 | 2.1154 | 56.195 | 1.5006 |
| Trial-33 | 3.3444 | 0.45286 | 3.5816 | 21.57 | 62.139 | 14.806 | 32.811 | 40.48 | 3.5877 | 52.841 | 1.5543 |
| Trial-34 | 2.8911 | 0.82884 | 2.1262 | 12.635 | 32.002 | 6.5865 | 42.441 | 56.409 | 4.3878 | 74.706 | 1.6943 |
| Trial-35 | 2.8359 | 1.9487 | 3.2283 | 16.718 | 51.083 | 10.081 | 35.881 | 47.907 | 3.0183 | 62.852 | 1.7403 |
| Trial-36 | 3.0239 | 5.8152 | 4.7197 | 23.553 | 58.381 | 16.483 | 26.411 | 41.481 | 3.0708 | 53.151 | 1.9268 |
| Trial-37 | 2.8292 | 1.8336 | 4.6049 | 13.739 | 53.014 | 9.2567 | 34.887 | 47.964 | 3.3692 | 64.386 | 2.0211 |
| Trial-38 | 2.6743 | 1.9185 | 3.9051 | 7.247 | 38.848 | 4.9707 | 40.536 | 57.039 | 4.6164 | 74.405 | 1.9619 |
| Trial-39 | 2.5742 | 1.1987 | 2.8056 | 5.598 | 35.342 | 10.221 | 39.913 | 57.527 | 3.4562 | 75.653 | 2.1787 |
| Trial-40 | 2.523 | 1.349 | 2.6924 | 5.2664 | 37.533 | 5.575 | 43.585 | 57.025 | 4.3385 | 75.136 | 2.6935 |
| Trial-41 | 2.4853 | 2.8155 | 2.0766 | 36.851 | 7.9613 | 5.55 | 43.477 | 55.983 | 3.4457 | 74.776 | 2.0631 |
| Trial-42 | 2.3016 | 0.79038 | 6.6874 | 38.524 | 5.2767 | 4.9817 | 44.168 | 54.38 | 4.1394 | 74.851 | 2.0233 |
| Trial-43 | 2.1424 | 6.1662 | 9.1002 | 52.418 | 2.3693 | 13.588 | 35.092 | 47.099 | 3.5154 | 64.196 | 2.0088 |
| Trial-44 | 1.5193 | 6.3575 | 10.191 | 55.898 | 2.5429 | 17.108 | 32.955 | 41.129 | 3.8657 | 64.157 | 2.1584 |
| Trial-45 | 1.9816 | 2.6001 | 13.749 | 52.993 | 2.701 | 9.9273 | 30.103 | 50.054 | 4.3164 | 65.377 | 2.4685 |
| Trial-46 | 2.2255 | 2.366 | 5.5371 | 26.85 | 2.3967 | 4.6185 | 44.059 | 53.563 | 4.6786 | 89.101 | 2.2944 |
| Trial-47 | 2.1482 | 2.0175 | 3.97 | 26.952 | 2.9809 | 3.8286 | 47.806 | 60.468 | 4.5227 | 81.159 | 1.4458 |
| Trial-48 | 2.1467 | 5.9127 | 4.1604 | 31.248 | 3.9728 | 4.982 | 43.173 | 57.506 | 5.0424 | 77.724 | 2.6392 |
| Trial-49 | 2.2492 | 8.566 | 3.1042 | 41.428 | 5.2265 | 13.917 | 35.682 | 53.059 | 4.1777 | 67.476 | 2.3619 |
| Trial-50 | 2.2092 | 6.9665 | 2.3616 | 40.84 | 5.9193 | 9.2985 | 38.616 | 52.336 | 4.3816 | 70.35 | 2.4182 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trial-51 | 2.0679 | 4.6354 | 3.0131 | 30.356 | 6.2194 | 3.7673 | 41.899 | 59.885 | 4.6303 | 78.296 | 2.5101 |
| Trial-52 | 2.1254 | 6.0481 | 2.5554 | 23.388 | 7.1069 | 7.2291 | 43.28 | 59.45 | 5.4082 | 78.301 | 2.5968 |
| Trial-53 | 3.317 | 6.5971 | 5.6603 | 39.872 | 7.664 | 16.081 | 32.622 | 20.822 | 37.977 | 64.556 | 2.675 |
| Trial-54 | 3.1477 | 10.849 | 5.5526 | 73.988 | 9.2225 | 26.369 | 21.297 | 14.576 | 26.585 | 43.255 | 2.1484 |
| Trial-55 | 4.0202 | 12.463 | 11.096 | 77.891 | 9.1061 | 23.865 | 21.145 | 11.892 | 24.274 | 39.631 | 2.0023 |
| Trial-56 | 2.5375 | 16.259 | 4.1872 | 61.198 | 9.0608 | 17.066 | 30.291 | 14.542 | 26.251 | 53.797 | 1.8982 |
| Trial-57 | 3.3291 | 19.723 | 9.3679 | 109.96 | 10.307 | 28.268 | 17.908 | 6.7714 | 9.1667 | 20.559 | 1.8704 |
| Trial-58 | 3.6429 | 20.882 | 12.689 | 127.46 | 7.7263 | 37.475 | 4.6086 | 9.0305 | 0.57769 | 9.033 | 2.1561 |
| Trial-59 | 3.4487 | 13.408 | 15.029 | 115.59 | 7.6697 | 33.422 | 9.2263 | 28.417 | 1.4261 | 7.6756 | 2.0185 |
| Trial-60 | 2.6512 | 15.077 | 7.8447 | 89.045 | 6.9705 | 28.68 | 16.388 | 64.246 | 1.781 | 2.2575 | 1.6177 |
| Trial-61 | 3.7775 | 19.529 | 10.663 | 104.69 | 6.7539 | 28.747 | 18.586 | 40.709 | 2.4161 | 1.387 | 1.2503 |
| Trial-62 | 3.9789 | 14.461 | 8.447 | 119.08 | 6.7335 | 36.504 | 7.3445 | 32.639 | 1.9891 | 1.0896 | 1.1553 |
| Trial-63 | 3.7629 | 11.263 | 11.905 | 86.626 | 5.9949 | 25.556 | 20.887 | 49.034 | 18.467 | 1.0109 | 3.0642 |
| Trial-64 | 3.7479 | 15.894 | 10.598 | 115.85 | 4.711 | 36.363 | 12.723 | 7.9296 | 28.438 | 0.58936 | 0.84582 |
| Trial-65 | 2.3306 | 11.906 | 7.6716 | 75.716 | 4.3777 | 23.893 | 28.935 | 20.273 | 60.793 | 1.0568 | 0.53701 |
| Trial-66 | 3.0408 | 16.336 | 9.687 | 86.075 | 3.0069 | 24.324 | 20.919 | 17.249 | 54.642 | 1.2288 | 0.66199 |
| Trial-67 | 5.1111 | 17.914 | 9.4403 | 124.43 | 4.3899 | 38.855 | 15.384 | 11.579 | 7.709 | 1.1118 | 1.179 |
| Trial-68 | 1.9747 | 18.001 | 9.981 | 113.29 | 2.5333 | 34.652 | 41.341 | 2.8278 | 10.434 | 1.4206 | 1.4272 |
| Trial-69 | 2.5301 | 15.532 | 12.193 | 128.41 | 1.6678 | 40.841 | 27.483 | 1.6818 | 3.2693 | 1.7061 | 1.3522 |
| Trial-70 | 2.2955 | 24.724 | 9.7491 | 129.2 | 8.9948 | 30.305 | 23.523 | 2.494 | 3.2402 | 1.3775 | 0.97593 |
| Trial-71 | 3.4373 | 14.701 | 16.151 | 108.64 | 7.4613 | 27.581 | 45.304 | 5.0951 | 6.7936 | 1.0445 | 1.1328 |
| Trial-72 | 1.6147 | 1.4542 | 8.4965 | 32.933 | 2.9898 | 5.4691 | 110.86 | 10.585 | 59.195 | 1.2472 | 2.6339 |
| Trial-73 | 1.7336 | 0.89985 | 2.6986 | 26.832 | 3.5054 | 4.425 | 70.098 | 10.522 | 108.83 | 4.7402 | 0.98182 |
| Trial-74 | 2.0403 | 2.9871 | 1.4979 | 28.685 | 7.1565 | 6.4773 | 54.67 | 24.716 | 105.6 | 1.9764 | 0.28904 |
| Trial-75 | 2.8189 | 1.589 | 3.6871 | 71.757 | 20.414 | 19.729 | 26.61 | 22.253 | 65.929 | 2.7764 | 0.44632 |
| Trial-76 | 2.1399 | 1.5904 | 2.4251 | 10.857 | 44.583 | 17.097 | 40.866 | 27.333 | 88.031 | 1.7649 | 0.79285 |
| Trial-77 | 3.5986 | 1.7791 | 4.5131 | 16.458 | 72.074 | 18.776 | 26.786 | 20.996 | 65.976 | 3.109 | 1.0947 |
| Trial-78 | 2.3209 | 3.1858 | 4.4855 | 15.992 | 72.175 | 15.507 | 31.367 | 23.731 | 66.817 | 1.9783 | 0.93805 |
| Trial-79 | 2.507 | 1.227 | 1.6812 | 5.4016 | 32.205 | 6.5382 | 46.329 | 34.235 | 103.9 | 2.9913 | 1.079 |
| Trial-80 | 2.6219 | 2.11 | 4.8633 | 19.559 | 78.475 | 22.171 | 25.399 | 19.468 | 57.565 | 2.4375 | 1.1865 |
| Trial-81 | 3.4467 | 2.6117 | 5.6836 | 22.992 | 86.501 | 21.169 | 22.565 | 17.709 | 51.279 | 2.2519 | 0.95683 |
| Trial-82 | 1.9249 | 1.9111 | 1.3315 | 5.5674 | 34.034 | 3.6794 | 41.008 | 33.613 | 108.68 | 4.7636 | 0.98888 |
| Trial-83 | 2.1543 | 4.4773 | 9.98 | 4.2558 | 49.304 | 10.129 | 40.795 | 26.233 | 84.15 | 3.2025 | 2.0408 |
| Trial-84 | 3.5387 | 3.8457 | 11.835 | 4.6849 | 48.284 | 15.793 | 36.088 | 25.505 | 83.805 | 3.2179 | 1.037 |
| Trial-85 | 2.8397 | 2.2675 | 12.667 | 4.1512 | 47.145 | 20.915 | 36.224 | 25.546 | 81.704 | 4.1064 | 1.0725 |
| Trial-86 | 2.9685 | 5.0497 | 21.145 | 5.5097 | 93.398 | 20.794 | 22.388 | 23.978 | 35.353 | 2.451 | 2.2178 |
| Trial-87 | 1.9263 | 5.7363 | 4.0403 | 1.0176 | 27.32 | 4.335 | 48.981 | 133.14 | 7.0665 | 4.1219 | 1.0252 |
| Trial-88 | 2.583 | 13.417 | 5.1961 | 6.2786 | 69.09 | 19.434 | 30.718 | 83.241 | 4.9101 | 2.8291 | 0.91666 |
| Trial-89 | 2.186 | 6.642 | 1.7585 | 4.3482 | 39.141 | 12.24 | 38.196 | 120.85 | 5.3231 | 3.8832 | 1.0592 |
| Trial-90 | 2.719 | 5.3349 | 3.4742 | 5.0506 | 33.452 | 14.513 | 13.628 | 143.86 | 8.4099 | 6.746 | 0.4982 |
| Trial-91 | 1.7081 | 11.68 | 2.4293 | 0.87863 | 26.012 | 5.9581 | 41.418 | 134.31 | 7.8315 | 4.3203 | 0.94238 |
| Trial-92 | 2.5941 | 14.892 | 19.355 | 8.969 | 127.9 | 28.084 | 13.426 | 19.027 | 1.8494 | 1.4759 | 0.92489 |
| Trial-93 | 2.6273 | 6.8245 | 27.554 | 8.4281 | 136.28 | 33.278 | 12.467 | 5.7853 | 1.9995 | 1.411 | 1.0519 |
| Trial-94 | 3.3595 | 30.39 | 107.29 | 15.093 | 15.216 | 28.337 | 14.876 | 18.643 | 2.1173 | 1.3127 | 0.8833 |
| Trial-95 | 1.8329 | 17.693 | 64.611 | 9.7462 | 1.8563 | 22.044 | 32.564 | 77.754 | 3.9193 | 2.0429 | 1.1905 |
| Trial-96 | 2.2739 | 18.713 | 97.022 | 22.891 | 4.8173 | 30.157 | 18.799 | 37.707 | 2.7883 | 1.2335 | 1.0785 |
| Trial-97 | 1.1704 | 18.922 | 35.308 | 10.507 | 1.407 | 11.417 | 12.912 | 131.94 | 8.875 | 2.8131 | 0.79095 |
| Trial-98 | 2.7806 | 21.375 | 103.49 | 19.01 | 7.7788 | 36.028 | 16.177 | 26.022 | 2.4767 | 1.172 | 1.2152 |
| Trial-99 | 2.2154 | 2.9828 | 9.3519 | 8.3415 | 2.3938 | 9.8627 | 47.335 | 140.89 | 7.5052 | 3.9924 | 1.3913 |
| Trial- | 2.3876 | 6.6364 | 114.6 | 29.71 | 4.5198 | 32.994 | 13.714 | 30.087 | 1.7764 | 0.61767 | 1.8674 |
| Median | 2.82 | 2.98 | 4.66 | 23.29 | 32.83 | 17.64 | 30.20 | 32.21 | 6.35 | 3.54 | 1.43 |

| D-Link | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Trial-1 | 1.8094 | 3.6447 | 8.8169 | 123.71 | 5.225 | 7.5529 | 2.0169 | 37.998 | 8.4633 | 6.1184 | 5.5502 |
| Trial-2 | 3.2395 | 7.6454 | 14.703 | 69.821 | 6.8514 | 4.8027 | 2.0179 | 95.311 | 7.5439 | 6.5954 | 6.1493 |
| Trial-3 | 2.5306 | 4.8125 | 9.3429 | 53.462 | 5.1735 | 6.7093 | 2.0405 | 104.56 | 7.7634 | 6.9952 | 5.4862 |
| Trial-4 | 2.2572 | 4.6753 | 9.406 | 50.312 | 5.0029 | 9.1984 | 2.0276 | 106.07 | 7.7997 | 6.0238 | 5.4634 |
| Trial-5 | 1.9034 | 7.9697 | 45.931 | 49.237 | 6.9403 | 4.8194 | 2.054 | 87.327 | 7.535 | 5.8828 | 5.6544 |
| Trial-6 | 2.5786 | 4.4763 | 9.8904 | 57.609 | 5.227 | 6.7642 | 2.0958 | 100.02 | 8.0525 | 7.0715 | 5.3627 |
| Trial-7 | 2.9013 | 4.9111 | 11.386 | 51.193 | 5.0812 | 8.0134 | 2.0953 | 103.39 | 7.5686 | 5.746 | 5.366 |
| Trial-8 | 2.4617 | 4.2563 | 11.331 | 52.75 | 5.8425 | 7.1259 | 2.1043 | 103.79 | 7.4806 | 8.168 | 5.4142 |
| Trial-9 | 2.8623 | 4.6237 | 10.817 | 54.45 | 5.4111 | 8.1075 | 2.0622 | 100.53 | 7.5577 | 6.771 | 5.5025 |
| Trial-10 | 2.7103 | 5.0872 | 10.476 | 47.723 | 5.0233 | 6.1027 | 2.1011 | 109.98 | 7.6758 | 8.2129 | 5.5789 |
| Trial-11 | 2.4561 | 4.9663 | 11.662 | 50.132 | 5.9213 | 5.9359 | 2.1513 | 105.07 | 7.6431 | 5.4974 | 5.5043 |
| Trial-12 | 2.686 | 5.1604 | 12.322 | 55.628 | 5.0566 | 8.0367 | 2.156 | 98.367 | 7.6945 | 6.5898 | 5.3221 |
| Trial-13 | 2.5369 | 4.9134 | 9.1853 | 60.482 | 5.162 | 10.42 | 2.1824 | 94.171 | 7.9179 | 5.437 | 5.5302 |
| Trial-14 | 2.4716 | 4.2382 | 10.001 | 64.921 | 5.0108 | 6.5488 | 3.2394 | 93.435 | 7.9998 | 6.6542 | 5.6866 |
| Trial-15 | 2.0194 | 4.5759 | 10.976 | 53.164 | 4.3935 | 6.3207 | 2.0835 | 104.5 | 8.2199 | 5.2607 | 5.641 |
| Trial-16 | 2.3719 | 4.6463 | 11.564 | 56.914 | 5.8018 | 6.636 | 3.3133 | 98.944 | 8.0843 | 5.1116 | 5.4957 |
| Trial-17 | 2.8699 | 3.8024 | 7.8313 | 120.12 | 5.0748 | 11.338 | 2.0805 | 40.808 | 8.7481 | 5.9803 | 5.7508 |
| Trial-18 | 1.918 | 3.909 | 10.261 | 131.71 | 5.0638 | 7.1468 | 2.2769 | 30.503 | 8.8027 | 5.5194 | 5.7999 |
| Trial-19 | 1.7001 | 3.9441 | 9.0427 | 91.343 | 4.8358 | 6.9522 | 2.2273 | 72.483 | 8.3135 | 5.3444 | 5.6655 |
| Trial-20 | 1.9113 | 3.95 | 8.601 | 89.802 | 4.849 | 6.6151 | 2.3975 | 70.733 | 8.6863 | 5.2825 | 6.4552 |
| Trial-21 | 1.927 | 4.2055 | 8.0606 | 65.848 | 4.7705 | 9.3428 | 2.4679 | 94.768 | 8.5262 | 6.367 | 5.8874 |
| Trial-22 | 1.9583 | 4.3731 | 8.6257 | 82.555 | 4.6859 | 10.243 | 2.5636 | 78.243 | 8.582 | 5.4235 | 6.0975 |
| Trial-23 | 1.9781 | 4.2578 | 7.9674 | 93.536 | 4.2508 | 5.7677 | 2.4887 | 69.627 | 8.0982 | 6.8005 | 5.2817 |
| Trial-24 | 1.7368 | 4.2394 | 8.3182 | 128.41 | 4.3445 | 6.9444 | 2.639 | 33.243 | 8.5007 | 6.3103 | 4.7345 |
| Trial-25 | 1.942 | 4.255 | 8.3793 | 51.771 | 4.71 | 6.9291 | 2.6439 | 109.11 | 8.2153 | 5.8852 | 5.367 |
| Trial-26 | 1.9145 | 4.189 | 8.6054 | 118.49 | 4.7338 | 5.7171 | 2.7041 | 42.855 | 8.2032 | 5.1745 | 5.4175 |
| Trial-27 | 1.8533 | 4.116 | 8.7731 | 117.38 | 4.6818 | 5.8284 | 2.4759 | 45.121 | 8.1171 | 5.406 | 5.2169 |
| Trial-28 | 1.4933 | 3.5984 | 9.4465 | 130.92 | 3.7052 | 6.6992 | 2.1729 | 34.471 | 7.8857 | 5.319 | 4.9025 |
| Trial-29 | 1.8126 | 4.2397 | 9.3481 | 79.02 | 4.8925 | 5.5462 | 2.452 | 81.714 | 8.588 | 5.593 | 5.3104 |
| Trial-30 | 1.8678 | 4.198 | 8.218 | 59.979 | 4.9683 | 5.6392 | 2.5147 | 101.89 | 8.0021 | 5.3472 | 5.2944 |
| Trial-31 | 1.8046 | 4.163 | 7.8991 | 34.813 | 4.9645 | 5.4454 | 2.5999 | 127.92 | 7.5224 | 6.3822 | 6.4424 |
| Trial-32 | 1.8208 | 4.1345 | 7.9926 | 104.84 | 5.1349 | 6.816 | 2.6062 | 56.979 | 8.2692 | 5.4993 | 5.2872 |
| Trial-33 | 1.7591 | 4.1973 | 10.614 | 120.12 | 5.1273 | 5.5862 | 2.5459 | 42.081 | 8.323 | 5.4824 | 4.9622 |
| Trial-34 | 1.7488 | 4.0766 | 8.0736 | 58.725 | 5.2611 | 5.3847 | 3.0243 | 103.11 | 8.2922 | 5.3967 | 5.0649 |
| Trial-35 | 1.7107 | 4.1529 | 8.0289 | 70.26 | 5.1836 | 6.872 | 2.4264 | 91.235 | 8.493 | 5.5682 | 5.7402 |
| Trial-36 | 1.6814 | 4.2373 | 7.5599 | 79.124 | 4.9872 | 9.1408 | 2.4173 | 85.057 | 7.7445 | 5.8783 | 4.7711 |
| Trial-37 | 1.666 | 4.2146 | 8.0402 | 71.591 | 5.2342 | 7.513 | 2.3668 | 89.142 | 8.6873 | 15.256 | 5.7277 |
| Trial-38 | 1.6807 | 4.3641 | 8.4011 | 56.627 | 5.1624 | 8.0651 | 2.2773 | 105.55 | 8.2475 | 7.5678 | 5.3272 |
| Trial-39 | 1.7002 | 4.351 | 8.1081 | 87.846 | 5.1997 | 6.055 | 2.1975 | 74.014 | 8.119 | 6.4035 | 5.3525 |
| Trial-40 | 1.709 | 4.3671 | 7.8985 | 16.137 | 5.2789 | 5.0419 | 2.1062 | 146.66 | 7.8123 | 8.063 | 6.4773 |
| Trial-41 | 1.7149 | 4.4073 | 8.2815 | 50.287 | 5.3213 | 5.7631 | 1.9554 | 111.39 | 8.1539 | 8.996 | 6.066 |
| Trial-42 | 1.7262 | 4.3872 | 7.5873 | 70.171 | 5.309 | 7.1135 | 1.8454 | 91.219 | 7.8719 | 6.6485 | 5.6968 |
| Trial-43 | 1.7327 | 4.3553 | 6.691 | 44.621 | 5.0313 | 6.1916 | 1.7362 | 131.68 | 3.5611 | 3.4545 | 3.4909 |
| Trial-44 | 1.7642 | 4.3747 | 6.5734 | 26.23 | 5.3963 | 7.801 | 2.6708 | 137.29 | 7.5553 | 6.1287 | 5.8468 |
| Trial-45 | 1.7971 | 4.0277 | 6.5934 | 43.653 | 5.0834 | 5.3269 | 1.4498 | 121.54 | 6.8986 | 6.0052 | 5.8895 |
| Trial-46 | 1.8682 | 3.7925 | 4.2284 | 45.411 | 4.4313 | 7.6542 | 1.4234 | 127.5 | 5.3511 | 5.3602 | 5.7494 |
| Trial-47 | 1.8079 | 4.3847 | 7.3203 | 38.174 | 5.3434 | 5.3309 | 1.3979 | 128.45 | 7.7208 | 6.3115 | 6.1204 |
| Trial-48 | 1.8034 | 4.4578 | 9.2845 | 80.209 | 5.4628 | 5.245 | 1.9628 | 80.243 | 7.7512 | 7.2785 | 5.9985 |
| Trial-49 | 1.7925 | 4.458 | 7.5961 | 24.108 | 5.5103 | 6.3442 | 1.3506 | 137.63 | 7.2298 | 7.615 | 6.1691 |
| Trial-50 | 1.7971 | 4.3676 | 7.4688 | 67.739 | 5.4739 | 6.9916 | 1.3932 | 94.056 | 8.2163 | 6.704 | 6.3663 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trial-51 | 1.7905 | 4.2799 | 8.5581 | 49.719 | 5.5997 | 5.3051 | 1.4743 | 111.01 | 7.9519 | 7.9474 | 6.1553 |
| Trial-52 | 1.7972 | 4.1616 | 8.5587 | 47.039 | 5.7658 | 5.2796 | 1.4566 | 113.48 | 8.256 | 7.7761 | 6.1745 |
| Trial-53 | 1.8116 | 4.1406 | 7.9524 | 38.33 | 5.5967 | 5.4159 | 1.5195 | 126.67 | 8.0478 | 6.091 | 6.7418 |
| Trial-54 | 1.4713 | 3.4499 | 8.0638 | 152.19 | 5.5842 | 7.1052 | 1.4463 | 11.075 | 8.5544 | 5.9282 | 4.9709 |
| Trial-55 | 1.8366 | 4.0583 | 8.5899 | 79.42 | 5.6001 | 8.8873 | 1.6468 | 82.622 | 8.2327 | 6.2078 | 6.1645 |
| Trial-56 | 1.8586 | 4.0734 | 7.6492 | 17.812 | 5.7734 | 8.9609 | 1.6382 | 145.89 | 7.1695 | 7.1148 | 5.7776 |
| Trial-57 | 1.8737 | 3.9084 | 6.0325 | 105.48 | 3.5627 | 5.1414 | 1.6277 | 68.06 | 6.5184 | 4.7496 | 3.3889 |
| Trial-58 | 1.856 | 3.6476 | 6.8716 | 88.108 | 5.0116 | 4.6226 | 1.7673 | 79.272 | 7.1257 | 5.5001 | 4.9335 |
| Trial-59 | 1.9033 | 4.0214 | 11.131 | 153.51 | 4.7063 | 5.5436 | 1.7633 | 16.845 | 7.7014 | 4.3673 | 3.5676 |
| Trial-60 | 1.5452 | 1.8274 | 6.1358 | 78.936 | 5.4392 | 8.0603 | 1.5131 | 99.449 | 4.0777 | 4.4867 | 2.3921 |
| Trial-61 | 1.9392 | 3.8496 | 8.8722 | 39.553 | 5.6607 | 5.2971 | 1.9473 | 121.85 | 7.8531 | 7.2353 | 5.6839 |
| Trial-62 | 1.9736 | 3.8329 | 5.5214 | 12.924 | 5.2452 | 5.3097 | 2.4174 | 157.05 | 5.9895 | 6.0829 | 5.2102 |
| Trial-63 | 1.9975 | 3.8775 | 5.6327 | 12.174 | 4.936 | 7.4015 | 2.0703 | 158.73 | 5.4711 | 5.2039 | 4.9491 |
| Trial-64 | 2.0035 | 3.6706 | 7.8251 | 57.935 | 5.4534 | 5.7314 | 1.9408 | 104.54 | 8.5093 | 8.5966 | 5.3194 |
| Trial-65 | 2.0128 | 3.7756 | 8.2054 | 13.014 | 5.7674 | 5.6342 | 1.9875 | 148.28 | 8.6673 | 6.4611 | 6.2286 |
| Trial-66 | 1.7174 | 3.3326 | 9.6956 | 78.161 | 5.1952 | 4.5151 | 2.0315 | 89.885 | 6.708 | 5.3379 | 4.4942 |
| Trial-67 | 1.9931 | 3.882 | 9.4759 | 96.346 | 5.6257 | 7.8277 | 2.1137 | 65.783 | 8.6953 | 5.7835 | 5.7389 |
| Trial-68 | 1.8157 | 3.5656 | 7.8922 | 56.66 | 5.4828 | 5.8984 | 2.2009 | 106.85 | 8.437 | 6.1022 | 4.9062 |
| Trial-69 | 1.982 | 3.1291 | 3.6141 | 91.194 | 3.0364 | 3.7338 | 1.9914 | 88.446 | 5.0501 | 4.6557 | 4.3035 |
| Trial-70 | 1.9286 | 3.5137 | 4.2158 | 59.855 | 4.5395 | 4.8547 | 2.1865 | 114.11 | 5.9871 | 4.7307 | 5.1922 |
| Trial-71 | 1.9822 | 3.728 | 7.2492 | 23.502 | 5.3696 | 5.0512 | 2.3833 | 144.76 | 7.2647 | 4.781 | 5.2407 |
| Trial-72 | 1.8647 | 3.3693 | 7.2693 | 93.233 | 4.4404 | 6.5331 | 2.5297 | 77.162 | 6.032 | 4.169 | 3.2469 |
| Trial-73 | 2.0119 | 3.4925 | 7.2099 | 10.448 | 5.5358 | 5.4197 | 2.6609 | 153.97 | 6.8625 | 7.4218 | 7.522 |
| Trial-74 | 2.0274 | 3.4589 | 6.503 | 10.453 | 5.4743 | 4.4179 | 2.6638 | 156.01 | 6.966 | 6.4535 | 5.3797 |
| Trial-75 | 2.0452 | 3.3296 | 10.83 | 153.02 | 3.5153 | 4.3544 | 2.7666 | 14.34 | 7.9505 | 4.6685 | 3.0766 |
| Trial-76 | 1.71 | 2.5965 | 7.1449 | 55.147 | 5.4895 | 6.4631 | 2.7506 | 112.98 | 5.9374 | 5.1301 | 4.3185 |
| Trial-77 | 2.0085 | 3.4551 | 8.016 | 54.178 | 5.5874 | 5.6942 | 2.8256 | 107.5 | 8.8129 | 6.6113 | 5.4866 |
| Trial-78 | 1.8541 | 3.2726 | 8.6694 | 131.59 | 4.5595 | 5.2012 | 2.8681 | 36.314 | 7.2434 | 4.8517 | 3.5153 |
| Trial-79 | 2.0334 | 3.3088 | 8.4902 | 33.146 | 5.6055 | 5.8031 | 2.8157 | 133.73 | 6.2397 | 5.1484 | 5.5568 |
| Trial-80 | 1.7279 | 2.6339 | 6.8952 | 90.008 | 5.5144 | 7.4293 | 2.2357 | 80.371 | 5.535 | 4.2889 | 5.4342 |
| Trial-81 | 2.0276 | 3.3904 | 10.514 | 75.513 | 5.6019 | 5.8866 | 2.8806 | 86.254 | 7.4905 | 6.1968 | 5.8562 |
| Trial-82 | 2.0172 | 3.3761 | 7.8898 | 55.473 | 5.7967 | 7.4583 | 2.938 | 104.56 | 7.9399 | 7.3117 | 5.8733 |
| Trial-83 | 2.0052 | 3.3369 | 5.6805 | 3.7209 | 5.7485 | 4.6599 | 2.978 | 163.83 | 4.9392 | 4.8478 | 5.4618 |
| Trial-84 | 1.9894 | 3.4304 | 6.1876 | 5.9698 | 5.6028 | 5.6537 | 3.0683 | 160.33 | 4.7631 | 5.9833 | 5.5215 |
| Trial-85 | 1.1934 | 1.9279 | 4.4459 | 103.55 | 5.5894 | 4.4896 | 2.5297 | 75.178 | 4.166 | 2.983 | 5.0345 |
| Trial-86 | 1.9893 | 3.5409 | 8.688 | 30.055 | 5.6601 | 5.9421 | 3.1719 | 132.69 | 7.6613 | 8.49 | 5.5954 |
| Trial-87 | 1.934 | 3.4877 | 8.2852 | 18.211 | 5.744 | 5.8073 | 3.1194 | 145.13 | 6.98 | 5.903 | 5.4589 |
| Trial-88 | 1.9136 | 3.5354 | 10.013 | 53.241 | 5.6617 | 5.9293 | 3.0712 | 111.45 | 8.3854 | 6.8503 | 5.607 |
| Trial-89 | 1.9091 | 3.6661 | 8.2496 | 28.858 | 5.6724 | 7.0444 | 3.0305 | 130.77 | 8.3765 | 8.176 | 6.3714 |
| Trial-90 | 1.9308 | 3.6218 | 6.2502 | 10.451 | 5.5255 | 4.4311 | 2.9898 | 155.11 | 6.3974 | 7.5142 | 5.4102 |
| Trial-91 | 1.9495 | 3.7527 | 8.4758 | 32.429 | 5.7621 | 5.375 | 2.9497 | 130.18 | 6.8242 | 6.0947 | 5.8152 |
| Trial-92 | 1.9423 | 3.9284 | 8.1343 | 15.457 | 5.6118 | 5.7304 | 3.0289 | 144.79 | 8.1105 | 7.8221 | 5.4543 |
| Trial-93 | 1.9147 | 4.0489 | 8.8137 | 52.551 | 5.6423 | 5.8031 | 3.0827 | 107.54 | 8.6759 | 9.3069 | 5.4025 |
| Trial-94 | 1.8973 | 4.1018 | 8.0573 | 33.046 | 5.6063 | 5.5294 | 3.2161 | 126.26 | 8.763 | 7.0328 | 5.397 |
| Trial-95 | 1.9234 | 3.7441 | 5.9537 | 46.121 | 5.0761 | 3.8508 | 3.1511 | 128.97 | 3.5365 | 6.5699 | 4.5629 |
| Trial-96 | 1.0655 | 2.5306 | 9.3991 | 172.2 | 4.4322 | 7.116 | 1.7989 | 1.7158 | 7.7469 | 2.8026 | 2.4577 |
| Trial-97 | 1.8769 | 3.8454 | 8.4701 | 99.808 | 5.4448 | 4.2388 | 3.0293 | 64.856 | 7.8801 | 5.7089 | 5.1117 |
| Trial-98 | 1.9268 | 4.4126 | 9.6115 | 89.115 | 5.0003 | 4.1094 | 3.1013 | 76.526 | 8.442 | 4.3961 | 4.9958 |
| Trial-99 | 1.9289 | 4.3826 | 7.5009 | 21.173 | 5.4929 | 5.5485 | 3.1277 | 144.27 | 8.0322 | 4.8616 | 5.7502 |
| Trial- | 2.6498 | 5.3576 | 9.2383 | 76.947 | 5.7114 | 4.0129 | 3.1721 | 99.943 | 8.869 | 4.4859 | 5.8062 |
| Median | 1.91 | 4.07 | 8.27 | 56.79 | 5.27 | 5.89 | 2.28 | 102.50 | 7.88 | 5.99 | 5.47 |

| Intel | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Trial-1 | 1.7135 | 3.029 | 15.298 | 3.7541 | 4.3243 | 163.58 | 18.458 | 11.543 | 69.436 | 4.7118 | 3.9497 |
| Trial-2 | 1.4587 | 3.4347 | 15.495 | 4.8146 | 5.2093 | 187.39 | 15.384 | 11.192 | 50.64 | 3.2203 | 1.8799 |
| Trial-3 | 1.6554 | 3.6115 | 14.199 | 8.3855 | 8.1889 | 180.92 | 17.693 | 8.0107 | 52.558 | 1.977 | 2.9409 |
| Trial-4 | 2.4298 | 3.665 | 4.6775 | 15.521 | 6.2736 | 183.89 | 14.259 | 8.041 | 50.699 | 6.5701 | 3.1896 |
| Trial-5 | 2.7923 | 3.2689 | 3.5337 | 16.973 | 7.4991 | 181.78 | 14.193 | 8.3985 | 50.174 | 8.4752 | 1.996 |
| Trial-6 | 3.1041 | 3.4457 | 4.482 | 16.515 | 6.929 | 181.56 | 14.902 | 9.0186 | 50.368 | 7.7396 | 1.1446 |
| Trial-7 | 2.9973 | 4.0334 | 4.5314 | 15.509 | 6.099 | 183.62 | 15.032 | 8.9443 | 49.406 | 9.5177 | 0.62203 |
| Trial-8 | 3.092 | 4.5546 | 4.6589 | 15.081 | 6.2681 | 182.88 | 14.882 | 9.0317 | 43.547 | 5.1238 | 10.281 |
| Trial-9 | 2.6815 | 5.0379 | 4.4111 | 15.529 | 7.4316 | 181.13 | 15.374 | 8.4876 | 15.803 | 4.8668 | 38.445 |
| Trial-10 | 1.5883 | 5.314 | 4.6189 | 15.797 | 6.7454 | 181.73 | 14.987 | 7.6986 | 16.724 | 5.5279 | 38.304 |
| Trial-11 | 1.2505 | 4.8254 | 15.045 | 6.225 | 7.2657 | 180.85 | 14.727 | 6.0383 | 19.661 | 4.2117 | 39.785 |
| Trial-12 | 2.2404 | 2.3428 | 19.2 | 6.0664 | 7.6421 | 178.24 | 14.084 | 6.7369 | 20.708 | 3.9146 | 38.046 |
| Trial-13 | 1.8675 | 1.8873 | 19.105 | 6.8242 | 7.2756 | 178.39 | 15.096 | 6.8017 | 22.158 | 3.0697 | 36.933 |
| Trial-14 | 2.1604 | 2.5973 | 20.298 | 7.3623 | 9.1233 | 174.34 | 15.263 | 6.2011 | 22.518 | 3.4593 | 36.073 |
| Trial-15 | 2.4006 | 3.0114 | 18.119 | 7.3492 | 8.6531 | 198.29 | 14.874 | 5.9997 | 23.744 | 3.8996 | 13.935 |
| Trial-16 | 1.6314 | 4.4153 | 22.094 | 5.8979 | 6.6787 | 174.77 | 15.468 | 6.6619 | 23.387 | 4.1577 | 34.185 |
| Trial-17 | 14.39 | 4.5988 | 9.6482 | 6.9126 | 7.197 | 172.74 | 16.443 | 6.0337 | 22.447 | 4.4405 | 34.476 |
| Trial-18 | 16.378 | 4.6089 | 9.6236 | 7.2305 | 7.2637 | 170.52 | 15.963 | 5.4383 | 24.236 | 5.0326 | 33.077 |
| Trial-19 | 3.9684 | 4.8351 | 20.219 | 6.4363 | 8.7893 | 170.95 | 16.066 | 5.8114 | 23.58 | 5.2905 | 33.44 |
| Trial-20 | 1.5151 | 4.742 | 21.558 | 8.2548 | 8.7597 | 170 | 16.373 | 6.2694 | 23.262 | 4.9394 | 33.606 |
| Trial-21 | 1.6246 | 2.7311 | 21.387 | 8.1302 | 10.141 | 171.12 | 15.198 | 7.6988 | 25.009 | 4.5572 | 32.602 |
| Trial-22 | 2.3468 | 1.9113 | 19.055 | 8.3687 | 10.444 | 173.93 | 15.418 | 7.4737 | 24.357 | 4.4985 | 32.509 |
| Trial-23 | 3.0965 | 3.057 | 18.086 | 5.9725 | 11.263 | 173.59 | 15.976 | 8.3844 | 23.692 | 3.831 | 32.776 |
| Trial-24 | 3.6492 | 3.8653 | 17.658 | 6.6908 | 10.932 | 172.4 | 14.944 | 8.3415 | 23.896 | 4.105 | 33.429 |
| Trial-25 | 1.4316 | 4.5336 | 16.799 | 7.6515 | 10.022 | 175.6 | 15.03 | 8.8678 | 20.944 | 3.5136 | 36.062 |
| Trial-26 | 1.6893 | 5.9611 | 15.514 | 7.9507 | 10.476 | 175 | 14.442 | 8.5034 | 20.795 | 4.1739 | 35.892 |
| Trial-27 | 4.1416 | 4.2329 | 15.641 | 5.0264 | 14.08 | 173.15 | 14.629 | 8.5482 | 19.38 | 4.4246 | 37.167 |
| Trial-28 | 1.7831 | 3.7754 | 14.932 | 7.5636 | 12.62 | 175.56 | 16.073 | 8.0857 | 18.03 | 4.3536 | 37.572 |
| Trial-29 | 2.4514 | 2.5308 | 15.642 | 8.2615 | 13.559 | 171.79 | 15.365 | 8.3072 | 25.802 | 4.8246 | 30.398 |
| Trial-30 | 1.3721 | 1.4524 | 15.468 | 8.1951 | 15.062 | 174.27 | 15.359 | 8.477 | 53.171 | 3.9511 | 3.461 |
| Trial-31 | 0.7976 | 1.5567 | 15.975 | 7.5776 | 17.154 | 171.69 | 14.815 | 9.1705 | 49.512 | 4.2346 | 7.4123 |
| Trial-32 | 1.6395 | 1.6529 | 15.551 | 7.5212 | 18.831 | 170.42 | 15.772 | 8.8187 | 48.878 | 4.9814 | 6.4442 |
| Trial-33 | 1.7322 | 1.9523 | 15.601 | 8.9436 | 20.15 | 167.08 | 15.223 | 8.9175 | 37.809 | 4.5811 | 18.038 |
| Trial-34 | 1.386 | 1.492 | 18.299 | 6.543 | 20.385 | 165.92 | 14.918 | 8.9457 | 52.54 | 7.4646 | 2.3347 |
| Trial-35 | 1.2395 | 1.6734 | 18.334 | 6.1109 | 20.936 | 166.72 | 14.58 | 8.639 | 51.664 | 8.8144 | 1.772 |
| Trial-36 | 1.3069 | 1.7738 | 16.283 | 5.8584 | 23.313 | 165.88 | 14.343 | 8.5267 | 52.434 | 8.2982 | 1.2767 |
| Trial-37 | 1.5068 | 1.8241 | 16.849 | 6.8865 | 22.841 | 164.06 | 14.329 | 8.3976 | 52.125 | 8.6494 | 0.90566 |
| Trial-38 | 1.4762 | 1.5521 | 16.106 | 7.1505 | 24.147 | 164.11 | 14.539 | 9.1984 | 54.748 | 6.4422 | 1.0584 |
| Trial-39 | 1.4888 | 1.2789 | 14.673 | 8.4057 | 25.926 | 161.16 | 14.685 | 8.7667 | 54.483 | 6.1992 | 1.1913 |
| Trial-40 | 1.3899 | 1.7111 | 14.11 | 12.119 | 25.475 | 158.79 | 15.078 | 8.3228 | 55.057 | 6.8976 | 0.9041 |
| Trial-41 | 1.1228 | 2.9519 | 12.104 | 11.215 | 25.696 | 162.83 | 13.047 | 8.322 | 53.938 | 9.4581 | 0.59667 |
| Trial-42 | 1.0634 | 4.0211 | 11.548 | 11.282 | 24.82 | 161.25 | 14.034 | 7.9042 | 10.489 | 52.243 | 0.60709 |
| Trial-43 | 1.744 | 4.0982 | 12.83 | 9.8578 | 24.31 | 161.1 | 14.053 | 7.8037 | 8.8695 | 29.92 | 24.6 |
| Trial-44 | 2.5385 | 4.08 | 11.432 | 8.8285 | 25.527 | 161.14 | 14.351 | 7.4589 | 8.3824 | 13.3 | 42.296 |
| Trial-45 | 3.3038 | 3.8313 | 13.057 | 7.5886 | 26.2 | 160 | 15.025 | 6.3143 | 8.4745 | 13.218 | 43.129 |
| Trial-46 | 3.8846 | 4.1195 | 11.404 | 8.419 | 26.846 | 158.87 | 14.374 | 6.0901 | 9.6136 | 13.399 | 42.307 |
| Trial-47 | 3.0119 | 4.2745 | 11.001 | 6.9492 | 27.292 | 162.16 | 14.549 | 6.653 | 8.6657 | 13.944 | 41.948 |
| Trial-48 | 1.5399 | 4.0459 | 8.3268 | 10.587 | 27.513 | 161.29 | 16.123 | 5.6129 | 17.623 | 5.2951 | 41.374 |
| Trial-49 | 1.0114 | 3.2603 | 7.4238 | 9.8543 | 27.505 | 164.88 | 16.205 | 5.5174 | 19.966 | 3.6723 | 41.226 |
| Trial-50 | 4.8966 | 1.9777 | 6.6324 | 6.5031 | 27.213 | 165.79 | 16.381 | 5.0037 | 21.574 | 4.2522 | 39.951 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Trial-51 | 5.065 | 0.99138 | 6.8786 | 6.2433 | 28.497 | 164.63 | 16.382 | 4.3912 | 19.903 | 5.0467 | 41.066 |
| Trial-52 | 2.5704 | 1.8533 | 6.1579 | 8.3026 | 27.323 | 166.3 | 15.87 | 4.3179 | 22.596 | 4.3629 | 39.654 |
| Trial-53 | 1.3904 | 3.718 | 5.4059 | 9.439 | 27.448 | 166.08 | 16.856 | 4.2736 | 22.965 | 3.735 | 38.772 |
| Trial-54 | 2.6942 | 3.4708 | 5.363 | 9.3205 | 27.043 | 165.34 | 16.977 | 3.4666 | 21.36 | 4.8375 | 39.463 |
| Trial-55 | 3.6203 | 3.2981 | 5.7995 | 8.5183 | 25.402 | 166.85 | 16.053 | 3.7544 | 21.9 | 4.8382 | 39.38 |
| Trial-56 | 4.3462 | 3.1385 | 6.7615 | 8.579 | 23.441 | 166.59 | 16.876 | 4.6554 | 21.999 | 4.6323 | 38.324 |
| Trial-57 | 4.4801 | 3.7721 | 7.4243 | 7.8921 | 22.557 | 168.63 | 17.372 | 4.6971 | 19.954 | 4.4211 | 39.081 |
| Trial-58 | 4.7649 | 3.2344 | 7.3425 | 7.3754 | 22.916 | 168.61 | 17.422 | 4.3267 | 20.2 | 4.0134 | 39.865 |
| Trial-59 | 5.1459 | 3.1067 | 8.399 | 5.8003 | 22.941 | 168.42 | 18.262 | 3.9253 | 11.631 | 10.764 | 41.737 |
| Trial-60 | 5.2001 | 3.0774 | 9.8447 | 5.4263 | 23.105 | 166.19 | 19.499 | 4.8655 | 8.9 | 13.148 | 40.845 |
| Trial-61 | 5.6236 | 3.1792 | 11.105 | 3.8298 | 22.91 | 166.64 | 16.958 | 5.9348 | 8.7387 | 50.82 | 4.4184 |
| Trial-62 | 6.3389 | 3.2544 | 9.1051 | 4.7379 | 21.754 | 168.83 | 16.776 | 5.8562 | 9.9707 | 52.85 | 1.0857 |
| Trial-63 | 5.6687 | 3.9519 | 10.138 | 3.6472 | 23.309 | 167.41 | 15.656 | 6.5072 | 7.3925 | 54.937 | 1.7172 |
| Trial-64 | 4.519 | 4.3458 | 10.078 | 3.3323 | 22.587 | 169.08 | 17.406 | 5.6945 | 7.6069 | 54.516 | 1.2449 |
| Trial-65 | 3.9828 | 4.1961 | 10.031 | 6.6235 | 22.632 | 166.19 | 17.552 | 5.1423 | 8.9151 | 53.084 | 1.9274 |
| Trial-66 | 3.5256 | 3.6104 | 10.657 | 6.348 | 22.551 | 166.37 | 16.784 | 5.293 | 7.6825 | 54.854 | 2.5795 |
| Trial-67 | 3.0243 | 3.2545 | 10.428 | 4.9099 | 23.482 | 168.47 | 16.57 | 4.6639 | 9.0035 | 54.919 | 1.2309 |
| Trial-68 | 3.3534 | 2.5731 | 10.199 | 5.1752 | 24.008 | 193.17 | 16.324 | 4.2436 | 8.9617 | 29.315 | 1.8689 |
| Trial-69 | 3.1166 | 2.1781 | 8.9235 | 5.0697 | 24.495 | 167.72 | 17.575 | 3.6194 | 9.0081 | 53.702 | 3.7674 |
| Trial-70 | 2.0005 | 2.0051 | 9.343 | 5.2746 | 24.497 | 169.08 | 14.455 | 5.3537 | 6.9107 | 56.146 | 3.412 |
| Trial-71 | 1.9346 | 2.115 | 9.148 | 5.2292 | 25.084 | 169.63 | 10.791 | 9.4071 | 8.105 | 54.7 | 3.9926 |
| Trial-72 | 1.0925 | 3.0672 | 9.4347 | 5.1068 | 25.228 | 169.16 | 11.428 | 8.9271 | 8.1917 | 53.519 | 4.812 |
| Trial-73 | 0.90406 | 3.6962 | 10.256 | 5.0282 | 24.803 | 168.02 | 10.462 | 8.524 | 9.3263 | 52.772 | 5.0645 |
| Trial-74 | 2.5099 | 4.1921 | 9.0969 | 4.512 | 24.576 | 168.39 | 11.164 | 7.3244 | 10.411 | 52.067 | 5.6154 |
| Trial-75 | 2.2104 | 4.91 | 7.4316 | 5.2934 | 23.974 | 168.48 | 10.733 | 8.9693 | 9.2659 | 52.096 | 5.6767 |
| Trial-76 | 2.5699 | 5.5681 | 6.7802 | 5.0378 | 25.339 | 167.73 | 10.302 | 8.8466 | 9.6855 | 51.681 | 5.8001 |
| Trial-77 | 3.2451 | 6.2901 | 6.1281 | 4.1923 | 24.616 | 167.98 | 11.126 | 8.7303 | 10.799 | 49.866 | 6.2464 |
| Trial-78 | 2.9028 | 6.7295 | 5.5508 | 4.9994 | 24.861 | 168.21 | 11.188 | 8.2531 | 9.4041 | 51.277 | 5.8147 |
| Trial-79 | 3.7464 | 7.2894 | 5.6068 | 4.5182 | 25.015 | 167.49 | 12.323 | 9.1198 | 9.8953 | 49.451 | 6.1153 |
| Trial-80 | 3.3947 | 7.4149 | 5.6056 | 5.0043 | 25.233 | 166.6 | 10.964 | 8.5274 | 9.7435 | 50.352 | 6.4014 |
| Trial-81 | 3.3922 | 7.248 | 5.3231 | 5.1912 | 25.186 | 166.77 | 13.835 | 5.6694 | 12.207 | 48.424 | 6.9369 |
| Trial-82 | 3.4898 | 7.2538 | 5.0964 | 5.9164 | 26.807 | 164.62 | 16.325 | 3.641 | 10.082 | 49.246 | 6.9245 |
| Trial-83 | 3.524 | 7.3086 | 5.5105 | 5.5817 | 27.758 | 163.9 | 17.585 | 4.2149 | 9.7151 | 48.054 | 7.129 |
| Trial-84 | 3.6171 | 7.2854 | 5.2303 | 5.566 | 27.47 | 162.29 | 18.151 | 3.7488 | 9.9853 | 49.24 | 6.5006 |
| Trial-85 | 3.9218 | 7.5823 | 6.3263 | 5.2476 | 30.736 | 159.7 | 18.514 | 4.6529 | 8.5825 | 48.928 | 6.1888 |
| Trial-86 | 3.2385 | 7.7731 | 6.4033 | 5.0099 | 29.375 | 160.34 | 18.051 | 6.0286 | 8.177 | 47.939 | 7.0837 |
| Trial-87 | 3.5472 | 7.8211 | 6.9231 | 5.3588 | 30.091 | 158.78 | 18.014 | 6.1717 | 8.428 | 47.833 | 6.5004 |
| Trial-88 | 3.6393 | 8.1342 | 7.2074 | 5.9513 | 28.726 | 159.06 | 18.323 | 6.6738 | 9.4168 | 46.827 | 6.0262 |
| Trial-89 | 3.7737 | 7.8093 | 6.7746 | 5.2864 | 27.216 | 162.61 | 19.807 | 6.3612 | 8.4864 | 46.85 | 6.0942 |
| Trial-90 | 3.7455 | 7.9632 | 8.0772 | 5.4321 | 16.603 | 170.59 | 19.262 | 5.0137 | 8.6761 | 48.565 | 5.5003 |
| Trial-91 | 3.5381 | 8.061 | 8.3292 | 5.1722 | 28.377 | 158.38 | 18.424 | 4.5876 | 8.8137 | 50.37 | 5.2407 |
| Trial-92 | 3.1731 | 7.9754 | 7.2137 | 5.5045 | 16.119 | 175.82 | 17.663 | 4.3174 | 9.3324 | 47.556 | 4.6762 |
| Trial-93 | 2.7439 | 7.8942 | 7.4056 | 5.1656 | 9.5708 | 92.385 | 15.283 | 3.2767 | 9.471 | 139.2 | 7.8886 |
| Trial-94 | 2.7971 | 8.2728 | 9.7262 | 5.728 | 27.72 | 71.279 | 13.883 | 7.1838 | 11.647 | 138.08 | 3.9153 |
| Trial-95 | 2.5868 | 7.7603 | 7.8709 | 5.5038 | 29.964 | 70.6 | 16.929 | 4.172 | 12.646 | 137.05 | 5.5799 |
| Trial-96 | 2.6281 | 7.387 | 8.1747 | 4.8449 | 29.25 | 71.963 | 16.302 | 3.3485 | 11.171 | 140.26 | 4.8571 |
| Trial-97 | 2.4566 | 7.7897 | 9.2747 | 4.5087 | 23.861 | 75.825 | 16.06 | 3.7801 | 11.42 | 140.22 | 3.8933 |
| Trial-98 | 2.4354 | 6.9849 | 10.305 | 4.9225 | 20.521 | 78.089 | 15.105 | 3.5394 | 9.2718 | 144.97 | 4.5222 |
| Trial-99 | 2.014 | 7.2256 | 11.263 | 4.7368 | 14.917 | 84.11 | 14.92 | 3.6752 | 9.4667 | 144.72 | 4.0031 |
| Trial- | 1.9524 | 6.6894 | 12.782 | 4.4156 | 12.808 | 110.68 | 11.182 | 7.902 | 11.992 | 117.32 | 4.029 |
| Median | 2.65 | 3.85 | 9.79 | 6.30 | 23.02 | 167.61 | 15.36 | 6.66 | 17.17 | 9.14 | 6.42 |

| Link-P | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Trial-1 | 4.1916 | 2.6015 | 10.554 | 117.75 | 4.0591 | 6.7515 | 1.2182 | 42.701 | 8.7469 | 5.6256 | 6.8006 |
| Trial-2 | 4.377 | 2.8388 | 9.3432 | 139.59 | 3.8824 | 8.1971 | 1.2094 | 20.428 | 8.3932 | 6.9154 | 6.8371 |
| Trial-3 | 4.5885 | 2.9526 | 11.634 | 142.75 | 3.6982 | 6.5028 | 1.188 | 16.535 | 8.4406 | 6.885 | 6.7884 |
| Trial-4 | 4.7685 | 3.1441 | 8.8505 | 97.205 | 3.497 | 7.5001 | 1.1646 | 62.662 | 8.4766 | 8.3691 | 6.8239 |
| Trial-5 | 4.8454 | 3.2277 | 10.318 | 114.98 | 3.4379 | 6.3971 | 1.1489 | 44.452 | 8.4265 | 6.9167 | 6.8576 |
| Trial-6 | 5.0077 | 3.0899 | 10.713 | 101.06 | 3.5112 | 5.9558 | 1.1063 | 58.799 | 8.438 | 7.1541 | 6.9089 |
| Trial-7 | 5.33 | 5.0435 | 18.394 | 103.94 | 6.2261 | 3.968 | 1.0575 | 64.691 | 8.0961 | 7.2008 | 6.6331 |
| Trial-8 | 5.3448 | 3.1625 | 10.093 | 94.916 | 3.434 | 7.0798 | 1.0612 | 65.765 | 8.3984 | 6.7105 | 6.9786 |
| Trial-9 | 5.4573 | 2.9531 | 12.539 | 153.57 | 3.3752 | 5.6271 | 1.222 | 5.8603 | 8.3966 | 5.9614 | 6.9885 |
| Trial-10 | 5.3618 | 2.9051 | 4.1657 | 150.9 | 0.96108 | 0.82614 | 1.0744 | 40.818 | 2.9664 | 2.7692 | 4.0207 |
| Trial-11 | 5.5187 | 3.0158 | 9.0173 | 143.31 | 3.3172 | 8.2541 | 1.1338 | 15.769 | 8.4819 | 7.0262 | 7.2144 |
| Trial-12 | 5.5182 | 3.1203 | 10.657 | 129.23 | 3.3091 | 10.637 | 1.0513 | 30.492 | 8.3665 | 6.3939 | 6.8988 |
| Trial-13 | 5.5105 | 3.1235 | 8.9004 | 102.57 | 3.2496 | 7.722 | 1.1038 | 56.643 | 8.4846 | 9.5288 | 6.7899 |
| Trial-14 | 5.4438 | 3.1041 | 12.895 | 129.89 | 3.3088 | 5.8196 | 1.3842 | 30.712 | 8.5677 | 5.7557 | 6.504 |
| Trial-15 | 5.334 | 3.0253 | 10.562 | 90.786 | 3.3412 | 5.7769 | 1.6066 | 68.571 | 8.3829 | 7.0712 | 6.8049 |
| Trial-16 | 2.8771 | 1.8901 | 12.98 | 162.35 | 3.33 | 5.7677 | 1.6623 | 4.5426 | 8.4135 | 4.8418 | 3.2553 |
| Trial-17 | 5.1695 | 3.1913 | 9.5592 | 91.102 | 3.2184 | 7.4767 | 1.9355 | 68.293 | 8.3858 | 6.8508 | 5.9733 |
| Trial-18 | 4.7006 | 3.1674 | 11.485 | 164.89 | 2.4371 | 8.0505 | 1.2933 | 4.4101 | 8.5404 | 3.9199 | 2.7041 |
| Trial-19 | 4.6909 | 3.2093 | 13.066 | 152.63 | 3.457 | 5.8057 | 2.2244 | 6.9668 | 8.433 | 5.7666 | 5.7244 |
| Trial-20 | 4.3698 | 3.2459 | 13.475 | 142.14 | 3.6687 | 5.635 | 2.4766 | 17.942 | 8.6446 | 7.0002 | 5.4629 |
| Trial-21 | 4.2611 | 3.3583 | 16.276 | 148.26 | 3.7183 | 5.6626 | 2.6627 | 12.459 | 8.5898 | 6.1445 | 5.4752 |
| Trial-22 | 3.5769 | 3.2136 | 11.107 | 157.06 | 3.9515 | 5.3408 | 2.4484 | 5.5259 | 8.3687 | 5.1573 | 4.7641 |
| Trial-23 | 3.8078 | 3.4641 | 10.906 | 142.3 | 4.1324 | 6.7284 | 2.9389 | 17.594 | 8.6147 | 6.8414 | 5.7369 |
| Trial-24 | 3.634 | 3.3906 | 11.803 | 124.95 | 4.2356 | 5.4994 | 3.0606 | 35.844 | 8.6454 | 6.3235 | 5.2197 |
| Trial-25 | 3.5622 | 3.5233 | 11.72 | 156.85 | 4.1633 | 8.7059 | 2.9292 | 3.7805 | 8.6447 | 6.4239 | 5.038 |
| Trial-26 | 3.4058 | 3.4866 | 13.515 | 119.56 | 4.4379 | 5.6066 | 2.8766 | 42.682 | 8.5299 | 5.7856 | 5.4998 |
| Trial-27 | 3.2497 | 3.5665 | 8.7675 | 152.99 | 4.5899 | 7.5489 | 2.6375 | 7.3595 | 8.4169 | 6.0356 | 5.505 |
| Trial-28 | 3.2086 | 3.7095 | 8.8226 | 149.15 | 4.5638 | 10.854 | 2.5584 | 11.136 | 8.413 | 6.425 | 5.4633 |
| Trial-29 | 3.1856 | 3.5552 | 10.444 | 145.88 | 4.6034 | 5.6738 | 2.5936 | 14.327 | 8.3896 | 7.3625 | 5.5829 |
| Trial-30 | 3.0926 | 3.6186 | 12.448 | 156.99 | 4.2644 | 5.7734 | 2.5646 | 3.7911 | 8.3429 | 5.9573 | 5.0132 |
| Trial-31 | 2.6219 | 2.6944 | 3.8796 | 51.597 | 4.76 | 5.5261 | 2.1097 | 126.57 | 3.1116 | 4.7333 | 5.45 |
| Trial-32 | 2.987 | 3.6756 | 10.401 | 153.49 | 4.7752 | 8.3424 | 2.5985 | 6.7116 | 8.2919 | 6.37 | 5.3741 |
| Trial-33 | 3.1082 | 3.6216 | 10.822 | 112.27 | 4.8343 | 6.1454 | 2.6402 | 49.269 | 8.2283 | 6.2017 | 5.8008 |
| Trial-34 | 2.6588 | 3.5389 | 10.377 | 163.88 | 3.3167 | 6.6335 | 2.6154 | 2.8791 | 7.8629 | 5.0545 | 2.9487 |
| Trial-35 | 3.1711 | 3.5225 | 12.268 | 123.67 | 4.8108 | 6.149 | 2.5483 | 36.267 | 8.2516 | 7.1727 | 5.1492 |
| Trial-36 | 3.1907 | 3.5682 | 16.965 | 156.03 | 4.8133 | 6.0889 | 2.4212 | 5.8946 | 8.2789 | 6.0214 | 4.7977 |
| Trial-37 | 3.2384 | 3.5737 | 11.066 | 111.63 | 4.8208 | 6.0448 | 2.514 | 49.075 | 8.038 | 6.8449 | 4.9479 |
| Trial-38 | 3.083 | 3.7175 | 13.392 | 144.57 | 4.8449 | 6.0204 | 2.5106 | 15.27 | 8.0196 | 6.864 | 4.9488 |
| Trial-39 | 2.9821 | 3.6875 | 12.046 | 125.02 | 4.9101 | 5.8193 | 2.5342 | 34.111 | 8.1076 | 8.0312 | 4.9461 |
| Trial-40 | 2.9878 | 3.8212 | 10.663 | 143.75 | 4.852 | 5.6546 | 2.5352 | 16.622 | 8.0505 | 6.7611 | 4.9843 |
| Trial-41 | 3.055 | 3.8063 | 10.044 | 149.21 | 4.7838 | 6.6247 | 2.5312 | 11.089 | 8.1561 | 6.3341 | 4.9597 |
| Trial-42 | 3.1205 | 3.6753 | 2.5016 | 38.445 | 2.8394 | 4.3863 | 2.0668 | 144.31 | 2.8578 | 3.655 | 3.7795 |
| Trial-43 | 3.1457 | 3.7297 | 11.276 | 160.02 | 4.8265 | 5.5664 | 2.6156 | 0.14198 | 8.0871 | 10.865 | 5.0641 |
| Trial-44 | 3.169 | 3.7367 | 8.5712 | 106.81 | 4.7964 | 8.2175 | 3.1293 | 53.379 | 7.8823 | 7.7997 | 4.966 |
| Trial-45 | 1.8145 | 3.0877 | 10.508 | 166.75 | 2.5305 | 5.3793 | 2.6756 | 3.2525 | 7.7453 | 3.9536 | 2.8829 |
| Trial-46 | 3.1606 | 3.6019 | 10.405 | 104.56 | 4.9212 | 5.6944 | 3.2616 | 55.673 | 7.8661 | 6.3972 | 4.9911 |
| Trial-47 | 2.8595 | 3.4923 | 9.3302 | 151.93 | 4.932 | 6.7935 | 2.9469 | 8.4841 | 7.9378 | 9.2468 | 4.965 |
| Trial-48 | 2.1978 | 2.7805 | 12.238 | 163.71 | 3.7584 | 5.7361 | 2.4129 | 2.3409 | 7.94 | 4.9976 | 3.5756 |
| Trial-49 | 1.3738 | 2.4822 | 9.9038 | 171.9 | 3.8997 | 4.4597 | 1.8707 | 2.1201 | 6.2581 | 4.3592 | 1.8312 |
| Trial-50 | 2.0062 | 3.5842 | 9.3732 | 164.21 | 4.0305 | 9.9111 | 2.0311 | 1.5003 | 7.9803 | 5.798 | 2.5922 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trial-51 | 2.825 | 3.5759 | 13.826 | 152.42 | 4.7732 | 5.6424 | 3.0168 | 8.6058 | 7.9542 | 5.8427 | 4.6446 |
| Trial-52 | 2.7482 | 3.5932 | 10.99 | 153.26 | 5.1414 | 5.636 | 3.0432 | 6.6791 | 7.9537 | 5.2286 | 5.1859 |
| Trial-53 | 2.2817 | 3.3832 | 9.1994 | 166.5 | 4.7379 | 7.3768 | 1.6714 | 0.89031 | 7.6766 | 4.2922 | 2.4539 |
| Trial-54 | 2.6199 | 3.6296 | 10.284 | 158.74 | 2.463 | 6.8527 | 3.0015 | 6.4049 | 8.0819 | 5.4108 | 3.1968 |
| Trial-55 | 2.6537 | 3.5272 | 9.8389 | 125.96 | 5.4632 | 5.6669 | 2.9743 | 34.166 | 8.1864 | 9.0512 | 5.1679 |
| Trial-56 | 0.72107 | 3.4823 | 12.098 | 161.04 | 4.4434 | 5.7287 | 2.3794 | 1.9569 | 8.1925 | 5.5416 | 5.0096 |
| Trial-57 | 2.6128 | 3.407 | 8.9724 | 130.12 | 5.6369 | 6.3665 | 2.9235 | 30.05 | 8.1687 | 5.6572 | 5.2404 |
| Trial-58 | 2.2915 | 3.0109 | 13.662 | 148.37 | 5.8816 | 5.6832 | 2.8641 | 12.472 | 8.196 | 5.6234 | 5.1869 |
| Trial-59 | 1.9363 | 2.3805 | 9.3095 | 162.96 | 3.9365 | 6.6893 | 2.0184 | 3.0307 | 8.1784 | 4.8156 | 4.1595 |
| Trial-60 | 1.1974 | 1.9328 | 8.8381 | 111.03 | 4.5485 | 3.2283 | 2.8762 | 68.427 | 4.1361 | 6.3514 | 4.1347 |
| Trial-61 | 0.47233 | 0.57752 | 11.582 | 175.04 | 3.8304 | 2.4901 | 2.6407 | 4.1866 | 6.1721 | 3.7902 | 2.2429 |
| Trial-62 | 1.3757 | 1.3629 | 11.722 | 170.55 | 1.7364 | 6.3163 | 1.2871 | 2.5106 | 7.6382 | 4.3396 | 4.0389 |
| Trial-63 | 1.1938 | 1.7366 | 13.462 | 167.93 | 2.615 | 6.8038 | 1.7427 | 1.7927 | 7.8329 | 4.9662 | 4.116 |
| Trial-64 | 2.2628 | 3.0369 | 8.6024 | 172.1 | 1.0236 | 6.397 | 2.6429 | 3.1156 | 6.9283 | 3.1433 | 2.3882 |
| Trial-65 | 2.1731 | 3.0652 | 15.487 | 165.14 | 0.61034 | 5.4534 | 2.9688 | 3.8765 | 7.7043 | 5.2083 | 2.5829 |
| Trial-66 | 2.1054 | 3.2097 | 11.035 | 137.51 | 6.0246 | 6.3818 | 2.921 | 22.996 | 7.7109 | 5.8425 | 5.6594 |
| Trial-67 | 2.1072 | 2.987 | 13.661 | 161.13 | 2.9056 | 5.5279 | 2.8642 | 3.1928 | 7.7539 | 5.9007 | 3.8761 |
| Trial-68 | 1.9933 | 3.2362 | 11.342 | 155.8 | 5.8604 | 7.4967 | 2.2858 | 6.1037 | 7.9198 | 9.1068 | 4.1444 |
| Trial-69 | 1.1986 | 2.7213 | 12.415 | 160.99 | 5.3807 | 5.5457 | 2.5899 | 2.0403 | 7.9347 | 7.4024 | 4.7043 |
| Trial-70 | 0.93032 | 0.21796 | 14.602 | 167.48 | 0.92309 | 5.6057 | 1.0106 | 2.9342 | 7.9085 | 6.1271 | 5.3184 |
| Trial-71 | 0.63958 | 3.0826 | 14.306 | 159.05 | 6.0356 | 5.6495 | 2.6986 | 1.9643 | 7.9471 | 6.614 | 5.1142 |
| Trial-72 | 1.827 | 3.216 | 14.446 | 164.08 | 3.0809 | 5.031 | 2.7759 | 3.5341 | 7.9967 | 5.5424 | 1.5505 |
| Trial-73 | 1.8 | 3.0834 | 9.5527 | 171.27 | 2.2968 | 2.8745 | 1.9109 | 8.2676 | 6.1864 | 3.5912 | 2.2083 |
| Trial-74 | 1.7356 | 3.1844 | 10.983 | 174.66 | 3.5028 | 1.7048 | 2.7542 | 5.107 | 5.596 | 1.6345 | 0.98055 |
| Trial-75 | 1.6918 | 3.2177 | 10.698 | 124.02 | 6.2713 | 6.4232 | 2.7571 | 36.032 | 8.0646 | 7.8537 | 5.4537 |
| Trial-76 | 1.6479 | 3.2494 | 14.057 | 151.5 | 3.8944 | 5.8026 | 2.7535 | 12.472 | 8.0246 | 6.4499 | 4.5227 |
| Trial-77 | 1.6167 | 3.0845 | 11.146 | 114.05 | 6.2975 | 5.8417 | 2.8121 | 45.907 | 8.0117 | 6.4059 | 5.3869 |
| Trial-78 | 1.5878 | 3.0725 | 12.748 | 138.77 | 5.5804 | 5.985 | 2.9658 | 21.371 | 8.1216 | 7.3233 | 4.5961 |
| Trial-79 | 1.0956 | 2.717 | 8.2908 | 175.12 | 4.9159 | 4.6039 | 2.9361 | 3.281 | 4.0142 | 3.5289 | 1.1855 |
| Trial-80 | 0.5413 | 3.0946 | 13.242 | 160.88 | 6.3063 | 5.9069 | 3.1047 | 0.99017 | 8.0905 | 5.9612 | 4.7082 |
| Trial-81 | 1.5255 | 3.2035 | 11.153 | 149.23 | 5.4978 | 8.2296 | 3.15 | 12.88 | 7.9046 | 5.5639 | 4.7629 |
| Trial-82 | 1.448 | 3.2092 | 7.9102 | 8.8221 | 6.3314 | 5.9506 | 3.2298 | 157.22 | 7.9296 | 8.6062 | 6.0566 |
| Trial-83 | 1.413 | 2.8707 | 1.6564 | 39.048 | 3.5805 | 1.5402 | 2.8665 | 147.34 | 3.9946 | 4.354 | 4.2759 |
| Trial-84 | 1.378 | 2.9028 | 5.8965 | 138.06 | 2.8644 | 6.4477 | 2.2379 | 40.046 | 5.2439 | 2.9479 | 2.5439 |
| Trial-85 | 1.3504 | 3.0997 | 4.4712 | 7.2116 | 6.048 | 4.5318 | 3.3293 | 168.52 | 3.4126 | 5.6653 | 5.3565 |
| Trial-86 | 1.3478 | 3.1586 | 4.514 | 26.104 | 5.7063 | 3.0525 | 3.3159 | 153.3 | 2.0348 | 4.8669 | 3.0982 |
| Trial-87 | 1.3524 | 3.1844 | 5.5317 | 3.3154 | 6.4092 | 3.8603 | 4.3765 | 169.75 | 2.6145 | 7.9544 | 4.6131 |
| Trial-88 | 1.3565 | 3.1557 | 8.3997 | 28.84 | 6.4258 | 5.7456 | 3.3168 | 131.59 | 7.9626 | 7.4628 | 4.5861 |
| Trial-89 | 1.3599 | 3.133 | 1.7393 | 6.0462 | 4.6565 | 4.4648 | 1.9545 | 175.69 | 4.971 | 6.8809 | 4.5444 |
| Trial-90 | 1.3717 | 3.1078 | 2.3335 | 6.299 | 5.4254 | 1.0466 | 3.2635 | 174.6 | 4.7318 | 5.1765 | 4.4382 |
| Trial-91 | 1.3512 | 2.7756 | 4.4782 | 15.057 | 6.1679 | 5.7407 | 2.8217 | 153.71 | 6.1842 | 5.5957 | 6.5464 |
| Trial-92 | 1.3405 | 1.8434 | 1.8246 | 37.555 | 5.3559 | 5.3556 | 1.432 | 141.46 | 2.3903 | 5.3717 | 4.1723 |
| Trial-93 | 1.3203 | 2.4249 | 0.46704 | 3.2727 | 6.602 | 5.661 | 2.8004 | 171.28 | 5.4801 | 12.848 | 4.5594 |
| Trial-94 | 1.3035 | 1.9809 | 1.5743 | 53.722 | 4.929 | 5.381 | 1.3979 | 127.38 | 2.8108 | 4.4925 | 5.5904 |
| Trial-95 | 1.329 | 3.0914 | 6.4296 | 168.52 | 2.9121 | 5.7725 | 2.1533 | 10.517 | 5.5375 | 3.819 | 1.6735 |
| Trial-96 | 1.2423 | 3.2781 | 5.2869 | 8.6847 | 6.4182 | 4.5795 | 3.8107 | 164.11 | 4.8639 | 7.79 | 5.327 |
| Trial-97 | 1.284 | 2.2112 | 1.1758 | 59.216 | 4.6732 | 6.3176 | 2.6189 | 118.34 | 5.6636 | 5.4437 | 4.6697 |
| Trial-98 | 1.2227 | 3.1239 | 4.2372 | 30.077 | 6.1504 | 3.0768 | 3.4308 | 146.97 | 4.1025 | 6.5683 | 5.2148 |
| Trial-99 | 1.2104 | 2.9734 | 1.6794 | 51.482 | 3.4476 | 4.3683 | 3.2506 | 134.33 | 3.3599 | 4.0219 | 2.8349 |
| Trial- | 2.203 | 2.4628 | 13.193 | 190.03 | 1.4902 | 3.7255 | 0.69672 | 3.1148 | 6.9162 | 4.6457 | 4.0779 |
| Median | 2.62 | 3.16 | 10.56 | 143.53 | 4.44 | 5.77 | 2.59 | 16.58 | 8.00 | 5.99 | 4.97 |

| Link-H | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Trial-1 | 8.1315 | 9.1695 | 0.5463 | 12.73 | 3.9871 | 91.515 | 26.942 | 8.4857 | 6.9336 | 60.243 | 0.9882 |
| Trial-2 | 8.0458 | 5.0157 | 0.57612 | 11.177 | 2.9093 | 108.3 | 30.391 | 10.44 | 5.2424 | 44.507 | 1.1253 |
| Trial-3 | 8.0216 | 4.7753 | 0.5247 | 10.926 | 2.4849 | 113.19 | 23.335 | 11.105 | 6.7952 | 45.78 | 1.1651 |
| Trial-4 | 8.6275 | 5.1607 | 0.69104 | 10.576 | 1.7388 | 161.5 | 16.376 | 8.9331 | 4.4434 | 9.395 | 1.1762 |
| Trial-5 | 9.1896 | 2.6131 | 0.56504 | 8.0102 | 2.5198 | 131.07 | 22.695 | 9.5018 | 5.7074 | 34.806 | 1.3816 |
| Trial-6 | 8.9514 | 5.2716 | 0.5448 | 6.6661 | 1.7511 | 162 | 21.027 | 8.1955 | 3.7236 | 9.1753 | 1.1594 |
| Trial-7 | 7.3989 | 10.244 | 2.0631 | 6.8587 | 1.7153 | 154.95 | 12.649 | 8.1639 | 10.461 | 12.717 | 1.4089 |
| Trial-8 | 6.0938 | 8.4657 | 3.9538 | 6.121 | 3.122 | 145.08 | 10.257 | 7.542 | 16.469 | 19.171 | 2.3235 |
| Trial-9 | 3.8661 | 7.8402 | 0.75466 | 4.4871 | 2.5896 | 84.745 | 7.8907 | 6.0641 | 27.676 | 79.88 | 2.8708 |
| Trial-10 | 5.3084 | 9.5392 | 1.2308 | 3.7515 | 5.4857 | 173.36 | 10.267 | 4.5061 | 9.5463 | 2.2672 | 3.2987 |
| Trial-11 | 5.6372 | 14.101 | 1.2672 | 2.8678 | 2.6943 | 132.34 | 8.5814 | 9.2768 | 13.94 | 33.02 | 4.8231 |
| Trial-12 | 6.8793 | 13.794 | 1.1947 | 2.4306 | 3.7309 | 164.91 | 8.386 | 7.7703 | 10.591 | 5.4655 | 3.3734 |
| Trial-13 | 8.3186 | 13.82 | 1.2762 | 1.903 | 2.8108 | 161.82 | 9.9128 | 7.2543 | 10.739 | 6.9201 | 3.8479 |
| Trial-14 | 3.3414 | 15.204 | 2.1783 | 1.4582 | 3.9103 | 161.4 | 8.9543 | 4.0499 | 8.3472 | 15.822 | 1.5182 |
| Trial-15 | 6.9285 | 16.34 | 0.87912 | 2.4766 | 3.852 | 158.8 | 12.647 | 6.1975 | 10.417 | 6.9552 | 1.5275 |
| Trial-16 | 7.2634 | 17.927 | 0.8177 | 1.3442 | 4.6162 | 165.26 | 11.652 | 5.4428 | 8.3711 | 4.8646 | 0.91946 |
| Trial-17 | 4.3676 | 10.046 | 0.66268 | 1.2246 | 7.2614 | 179.38 | 8.3591 | 4.3981 | 7.0303 | 4.8673 | 0.84023 |
| Trial-18 | 9.3908 | 11 | 0.65906 | 1.3221 | 3.1405 | 139.52 | 11.944 | 7.0927 | 12.963 | 30.629 | 0.83499 |
| Trial-19 | 6.3536 | 6.7073 | 0.9009 | 2.3174 | 4.254 | 159.76 | 8.3568 | 7.8811 | 8.071 | 22.43 | 1.5407 |
| Trial-20 | 11.878 | 11.279 | 0.81235 | 1.1115 | 1.5831 | 164.32 | 9.1431 | 6.3071 | 10.742 | 7.594 | 4.7204 |
| Trial-21 | 11.72 | 9.3726 | 0.4541 | 0.81856 | 6.5712 | 167.13 | 8.8178 | 11.595 | 3.1578 | 5.8942 | 2.8962 |
| Trial-22 | 12.361 | 4.1326 | 0.76118 | 0.514 | 3.3888 | 129.7 | 8.4935 | 24.029 | 3.0353 | 39.87 | 2.4261 |
| Trial-23 | 6.7282 | 6.1117 | 4.157 | 0.37605 | 1.7442 | 127.78 | 7.9993 | 17.73 | 4.1185 | 50.571 | 1.2601 |
| Trial-24 | 13.841 | 5.7896 | 0.37964 | 0.51906 | 2.041 | 152.82 | 10.797 | 15.821 | 3.9827 | 21.831 | 0.85191 |
| Trial-25 | 8.932 | 3.4712 | 1.3359 | 0.61049 | 2.6536 | 175.87 | 8.7495 | 11.686 | 3.1903 | 10.818 | 1.0369 |
| Trial-26 | 10.414 | 6.4716 | 0.20386 | 0.72149 | 3.1241 | 176.55 | 9.7414 | 9.4017 | 3.8575 | 4.6751 | 1.93 |
| Trial-27 | 14.235 | 2.4098 | 0.2803 | 2.3753 | 12.516 | 166.29 | 9.7674 | 8.9178 | 4.0246 | 5.32 | 2.2586 |
| Trial-28 | 13.889 | 4.3327 | 0.32608 | 3.8085 | 5.3213 | 162.8 | 9.7005 | 8.6293 | 5.2994 | 11.576 | 2.6262 |
| Trial-29 | 15.411 | 1.241 | 1.5195 | 3.914 | 6.5978 | 133.27 | 9.4801 | 15.142 | 5.3493 | 32.252 | 2.7702 |
| Trial-30 | 14.309 | 3.057 | 0.92885 | 3.5577 | 5.9924 | 156.53 | 11.643 | 15.164 | 1.8955 | 10.737 | 3.5061 |
| Trial-31 | 14.371 | 1.8152 | 0.66903 | 3.3201 | 8.0321 | 126.65 | 12.656 | 52.4 | 2.665 | 2.8853 | 2.2851 |
| Trial-32 | 14.137 | 3.1762 | 1.6225 | 3.321 | 3.3256 | 166.37 | 10.16 | 15.334 | 3.4876 | 4.4932 | 1.7105 |
| Trial-33 | 16.346 | 3.3073 | 1.8467 | 4.2616 | 24.487 | 125.96 | 10.318 | 30.276 | 4.1912 | 6.3921 | 1.3176 |
| Trial-34 | 7.5006 | 4.7648 | 2.0527 | 10.518 | 23.484 | 128.11 | 11.748 | 29.764 | 3.9434 | 1.6165 | 4.0406 |
| Trial-35 | 3.4641 | 4.7967 | 1.9533 | 8.6385 | 32.992 | 141.1 | 10.428 | 15.945 | 3.3241 | 1.6667 | 4.3113 |
| Trial-36 | 3.5024 | 8.9538 | 1.7498 | 9.9379 | 31.047 | 133.29 | 10.501 | 20.718 | 3.0768 | 73.523 | 3.7421 |
| Trial-37 | 3.9139 | 6.6719 | 1.6671 | 12.485 | 32.346 | 120.99 | 10.606 | 30.347 | 4.9226 | 1.3894 | 3.2393 |
| Trial-38 | 4.163 | 3.0955 | 1.8186 | 10.917 | 26.59 | 149.69 | 8.9192 | 14.761 | 3.8894 | 2.1653 | 2.3987 |
| Trial-39 | 5.8062 | 3.8446 | 1.9892 | 10.078 | 25.246 | 148.9 | 9.4104 | 15.309 | 4.0291 | 2.5019 | 1.5127 |
| Trial-40 | 5.8984 | 4.7252 | 2.2106 | 13.405 | 26.622 | 115.26 | 9.5394 | 39.766 | 5.205 | 4.3316 | 0.74175 |
| Trial-41 | 5.5745 | 8.8537 | 2.0667 | 7.207 | 24.191 | 140.77 | 9.0727 | 21.933 | 4.0017 | 4.4237 | 0.60574 |
| Trial-42 | 7.1558 | 6.8663 | 2.3424 | 13.208 | 77.32 | 14.483 | 10.291 | 83.332 | 4.4893 | 4.911 | 1.5237 |
| Trial-43 | 5.4018 | 8.8869 | 2.1584 | 4.9984 | 47.005 | 5.6531 | 7.7221 | 139.75 | 3.112 | 3.3797 | 0.42284 |
| Trial-44 | 10.569 | 10.893 | 2.7126 | 13.235 | 90.07 | 12.424 | 7.2308 | 68.693 | 4.5115 | 6.6073 | 1.513 |
| Trial-45 | 6.2639 | 3.122 | 3.4855 | 12.976 | 143.22 | 22.904 | 7.2533 | 16.363 | 4.3341 | 6.7887 | 1.5912 |
| Trial-46 | 3.9423 | 3.7555 | 2.3941 | 13.703 | 72.921 | 46.247 | 8.2522 | 64.847 | 4.2905 | 7.2221 | 1.3807 |
| Trial-47 | 7.7122 | 5.1771 | 4.5441 | 7.8226 | 29.117 | 128.39 | 8.543 | 27.456 | 4.2926 | 4.8617 | 0.8333 |
| Trial-48 | 5.1842 | 2.9143 | 2.5192 | 10.599 | 15.951 | 160.74 | 8.1147 | 14.229 | 3.6784 | 1.1042 | 2.2621 |
| Trial-49 | 6.3237 | 2.9635 | 2.0495 | 8.0581 | 10.264 | 162.93 | 10.872 | 17.342 | 4.1318 | 1.2916 | 1.0384 |
| Trial-50 | 7.3591 | 2.4394 | 2.5652 | 9.3073 | 10.545 | 167.44 | 17.27 | 5.2619 | 4.2458 | 1.0296 | 0.9457 |

| Trial-51 | 3.461 | 4.2236 | 1.0661 | 10.427 | 6.3458 | 73.597 | 83.492 | 37.375 | 3.529 | 1.974 | 2.1231 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trial-52 | 4.7469 | 1.8365 | 3.8996 | 6.4437 | 3.8525 | 87.59 | 90.856 | 22.056 | 3.1427 | 3.3315 | 0.71458 |
| Trial-53 | 7.0266 | 2.7386 | 2.8202 | 16.536 | 5.9333 | 155.67 | 15.759 | 11.348 | 4.7489 | 1.3968 | 3.5323 |
| Trial-54 | 6.98 | 1.7241 | 1.9575 | 10.369 | 13.205 | 167.23 | 6.83 | 9.3701 | 3.0854 | 1.2393 | 5.3418 |
| Trial-55 | 7.3478 | 2.4325 | 2.5326 | 13.903 | 4.5907 | 123.19 | 8.2386 | 17.908 | 3.1925 | 1.3012 | 44.937 |
| Trial-56 | 2.4394 | 1.2419 | 3.1166 | 10.522 | 7.6152 | 153.22 | 5.0141 | 18.031 | 3.4357 | 0.83749 | 21.792 |
| Trial-57 | 3.1748 | 1.5961 | 4.2259 | 12.66 | 4.1835 | 133.57 | 15.992 | 8.7631 | 2.3831 | 3.2885 | 39.35 |
| Trial-58 | 2.153 | 0.47375 | 3.4404 | 10.464 | 3.9309 | 139.58 | 35.208 | 2.9084 | 3.0205 | 6.6083 | 19.723 |
| Trial-59 | 1.0078 | 1.1701 | 3.7013 | 7.0444 | 1.3368 | 112.82 | 76.902 | 3.3235 | 1.7111 | 5.9248 | 13.544 |
| Trial-60 | 1.7048 | 5.2989 | 0.91989 | 7.5929 | 1.1504 | 124.82 | 60.745 | 15.433 | 1.7551 | 5.488 | 3.7111 |
| Trial-61 | 1.948 | 7.7545 | 0.8386 | 9.5535 | 5.9805 | 140.59 | 42.107 | 4.5484 | 2.0057 | 4.9223 | 9.5036 |
| Trial-62 | 2.5491 | 12.196 | 2.2668 | 11.431 | 3.3241 | 146.02 | 27.757 | 5.2646 | 8.0198 | 4.7252 | 4.9425 |
| Trial-63 | 4.3196 | 12.392 | 5.3561 | 10.279 | 3.5426 | 134.63 | 35.241 | 5.4002 | 11.607 | 4.319 | 1.0528 |
| Trial-64 | 5.4618 | 13.826 | 1.8522 | 10.977 | 2.4522 | 138.96 | 35.184 | 5.5837 | 10.389 | 2.7302 | 1.235 |
| Trial-65 | 5.5092 | 10.31 | 3.0676 | 11.18 | 2.3317 | 162.4 | 18.682 | 6.6837 | 5.9178 | 1.9476 | 0.57089 |
| Trial-66 | 5.8961 | 2.0582 | 0.84054 | 7.4018 | 9.4938 | 149.27 | 37.146 | 13.422 | 1.0205 | 1.0239 | 0.97795 |
| Trial-67 | 10.678 | 7.4757 | 0.29918 | 11.313 | 4.2047 | 159.14 | 21.398 | 11.429 | 1.5042 | 0.48528 | 0.5298 |
| Trial-68 | 6.4088 | 2.1408 | 0.41016 | 12.627 | 9.213 | 130.71 | 45.934 | 19.441 | 1.9673 | 0.32031 | 0.28462 |
| Trial-69 | 5.0526 | 5.7678 | 0.66956 | 7.9546 | 5.3773 | 147.15 | 41.979 | 11.927 | 1.0859 | 0.21555 | 1.2968 |
| Trial-70 | 10.286 | 5.8416 | 0.58904 | 12.18 | 3.9046 | 114.31 | 55.472 | 7.885 | 0.98239 | 15.246 | 2.3825 |
| Trial-71 | 8.8188 | 8.294 | 1.2013 | 10.261 | 2.5777 | 164.81 | 21.733 | 3.3005 | 1.5388 | 3.3284 | 1.4525 |
| Trial-72 | 8.9787 | 10.275 | 2.6959 | 10.072 | 3.6217 | 130.63 | 43.098 | 4.2878 | 2.2097 | 10.137 | 2.3446 |
| Trial-73 | 6.6049 | 10.747 | 1.5114 | 8.7615 | 3.8148 | 171.54 | 10.907 | 3.4761 | 2.7678 | 6.8824 | 0.31448 |
| Trial-74 | 9.2253 | 4.9582 | 1.808 | 8.2645 | 1.8853 | 46.971 | 29.831 | 5.4004 | 8.8744 | 110.08 | 0.19023 |
| Trial-75 | 6.9107 | 6.8902 | 1.4447 | 4.8768 | 2.0956 | 125.26 | 23.622 | 2.2274 | 4.7249 | 48.977 | 0.33789 |
| Trial-76 | 5.574 | 1.6014 | 1.5961 | 10.414 | 3.9642 | 86.551 | 26.559 | 6.9278 | 0.64455 | 84.46 | 0.34466 |
| Trial-77 | 6.4991 | 3.1888 | 1.2365 | 9.3351 | 2.7985 | 86.418 | 27.071 | 11.978 | 1.0908 | 78.738 | 0.47181 |
| Trial-78 | 4.54 | 10.911 | 0.85856 | 10.205 | 3.4824 | 85.44 | 19.009 | 13.888 | 1.0168 | 78.835 | 0.58413 |
| Trial-79 | 5.6483 | 20.091 | 0.77061 | 11.507 | 3.5 | 157.91 | 11.448 | 6.2439 | 1.1122 | 8.3189 | 0.83008 |
| Trial-80 | 2.7137 | 26.627 | 2.9382 | 10.616 | 6.1207 | 131.04 | 15.036 | 8.2104 | 1.8042 | 21.086 | 0.92927 |
| Trial-81 | 2.1226 | 22.299 | 1.7071 | 10.058 | 9.6578 | 151.49 | 13.054 | 6.9386 | 1.4978 | 8.4318 | 0.97932 |
| Trial-82 | 2.3403 | 10.054 | 0.73977 | 9.0755 | 2.5635 | 175.81 | 11.154 | 4.5822 | 1.3541 | 7.4981 | 1.0524 |
| Trial-83 | 4.259 | 4.863 | 0.85003 | 10.567 | 4.655 | 116.56 | 25.413 | 10.465 | 1.857 | 47.711 | 1.2616 |
| Trial-84 | 4.5633 | 7.8775 | 0.56722 | 7.3819 | 2.469 | 52.459 | 27.24 | 21.975 | 1.7709 | 101.16 | 1.1135 |
| Trial-85 | 5.2632 | 10.895 | 0.76208 | 5.3405 | 5.6503 | 164.24 | 11.81 | 6.4573 | 1.8641 | 15.119 | 0.92331 |
| Trial-86 | 7.6805 | 13.3 | 1.3586 | 10.336 | 3.6615 | 136.59 | 14.834 | 8.9927 | 2.239 | 28.918 | 0.78865 |
| Trial-87 | 2.5632 | 3.8803 | 6.889 | 6.7522 | 2.7731 | 143.76 | 15.948 | 11.205 | 1.8592 | 32.56 | 0.61242 |
| Trial-88 | 1.6163 | 3.6239 | 5.0646 | 5.0067 | 1.6814 | 99.398 | 24.987 | 6.8715 | 2.2809 | 76.071 | 0.59239 |
| Trial-89 | 3.1832 | 9.1962 | 6.6792 | 6.1489 | 3.2835 | 167.08 | 12.063 | 7.4213 | 1.7851 | 10.15 | 0.59206 |
| Trial-90 | 3.9455 | 3.8561 | 8.5562 | 5.3957 | 2.8899 | 110.55 | 17.009 | 12.035 | 2.686 | 59.474 | 0.67632 |
| Trial-91 | 5.9196 | 5.087 | 8.3824 | 5.4783 | 6.2758 | 155.88 | 14.001 | 9.1608 | 47.295 | 16.828 | 0.74337 |
| Trial-92 | 6.2874 | 2.9463 | 10.811 | 5.4082 | 2.6985 | 159.02 | 15.206 | 9.3536 | 1.9458 | 13.775 | 0.7668 |
| Trial-93 | 4.432 | 7.8328 | 6.8487 | 6.0506 | 3.5452 | 148.55 | 13.83 | 7.5404 | 2.3984 | 25.57 | 0.68064 |
| Trial-94 | 5.1594 | 2.915 | 6.5855 | 6.049 | 1.1986 | 84.242 | 29.007 | 10.782 | 63.367 | 79.325 | 0.46468 |
| Trial-95 | 7.1871 | 4.046 | 4.3047 | 7.9757 | 2.8943 | 78.533 | 22.759 | 13.248 | 2.101 | 85.253 | 0.37711 |
| Trial-96 | 11.461 | 3.5228 | 2.4766 | 8.8929 | 4.9394 | 109.88 | 22.88 | 10.395 | 1.9368 | 51.763 | 0.34964 |
| Trial-97 | 7.9043 | 10.898 | 4.6686 | 5.9142 | 3.443 | 170.61 | 11.66 | 5.1062 | 1.2569 | 5.5421 | 0.29263 |
| Trial-98 | 10.781 | 6.1274 | 4.5878 | 7.9962 | 1.8335 | 144.05 | 19.105 | 9.0878 | 2.217 | 22.476 | 0.33915 |
| Trial-99 | 8.3898 | 4.2197 | 2.755 | 5.8278 | 4.055 | 61.638 | 31.929 | 12.199 | 2.0486 | 95.203 | 0.24321 |
| Trial- | 10.377 | 6.7494 | 2.2197 | 6.4566 | 6.0427 | 151.56 | 16.316 | 8.7064 | 1.2994 | 18.845 | 0.21735 |
| Median | 6.38 | 5.53 | 1.73 | 7.97 | 3.92 | 140.68 | 12.65 | 9.39 | 3.60 | 7.36 | 1.25 |

| Cisco | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Channel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| Trial-1 | 1.6643 | 10.009 | 2.5581 | 20.133 | 7.116 | 116.36 | 8.4167 | 62.882 | 0.62837 | 5.9525 | 1.0415 |
| Trial-2 | 1.3027 | 15.969 | 2.1893 | 22.657 | 6.784 | 118.58 | 6.4612 | 58.036 | 1.3894 | 2.7779 | 1.0686 |
| Trial-3 | 1.17 | 14.219 | 2.1246 | 28.659 | 3.7381 | 112.39 | 6.7079 | 56.385 | 2.7288 | 8.3808 | 1.4722 |
| Trial-4 | 0.90782 | 13.642 | 2.0349 | 25.574 | 3.8794 | 148.79 | 9.6478 | 27.62 | 2.5849 | 1.6608 | 0.89803 |
| Trial-5 | 0.81656 | 14.224 | 2.15 | 16.575 | 8.2832 | 130.1 | 4.4157 | 52.165 | 2.4906 | 5.6798 | 1.3159 |
| Trial-6 | 0.88694 | 13.583 | 1.8014 | 14.352 | 4.6716 | 50.084 | 3.1071 | 124.47 | 2.1978 | 12.414 | 9.3466 |
| Trial-7 | 0.91456 | 15.845 | 1.6843 | 18.427 | 4.6168 | 116.43 | 7.7986 | 42.991 | 2.401 | 22.437 | 0.70932 |
| Trial-8 | 0.9757 | 11.098 | 1.6411 | 17.679 | 3.5129 | 102.75 | 3.263 | 9.4137 | 0.66193 | 85.15 | 0.82819 |
| Trial-9 | 1.1009 | 7.2179 | 1.4578 | 28.267 | 5.2606 | 146.83 | 6.1632 | 11.465 | 1.5685 | 25.285 | 1.8664 |
| Trial-10 | 1.1316 | 13.353 | 1.2244 | 15.938 | 10.681 | 95.516 | 7.0492 | 15.603 | 15.376 | 75.111 | 1.3521 |
| Trial-11 | 1.1828 | 8.0963 | 1.1357 | 19.738 | 12.911 | 123.05 | 7.6862 | 16.268 | 1.5596 | 46.388 | 1.0273 |
| Trial-12 | 1.184 | 14.57 | 0.74632 | 15.59 | 5.1787 | 94.057 | 5.3195 | 15.411 | 2.0462 | 77.854 | 4.3271 |
| Trial-13 | 1.1458 | 5.0177 | 0.85004 | 15.535 | 4.1276 | 73.01 | 3.3416 | 22.068 | 0.62766 | 103.05 | 0.8796 |
| Trial-14 | 1.2684 | 3.8081 | 5.1575 | 18.77 | 5.2711 | 129.12 | 6.2918 | 17.776 | 0.75623 | 47.641 | 1.1916 |
| Trial-15 | 1.2898 | 2.5613 | 4.5853 | 18.298 | 4.2447 | 53.564 | 1.6665 | 17.803 | 1.5143 | 125.82 | 6.222 |
| Trial-16 | 1.0919 | 1.861 | 5.8425 | 16.907 | 3.5533 | 94.076 | 1.8893 | 6.9411 | 1.6409 | 101.08 | 2.5219 |
| Trial-17 | 0.88001 | 2.2227 | 5.4791 | 15.059 | 6.5581 | 37.695 | 2.3979 | 19.777 | 3.3831 | 139.33 | 5.5087 |
| Trial-18 | 0.83718 | 6.1042 | 5.1726 | 17.384 | 4.6249 | 145.58 | 4.6667 | 18.325 | 2.9641 | 28.563 | 1.2402 |
| Trial-19 | 0.99596 | 2.2808 | 5.9819 | 20.125 | 6.1751 | 104 | 6.4837 | 22.333 | 2.4399 | 64.077 | 2.0311 |
| Trial-20 | 1.003 | 1.7871 | 5.1345 | 17.596 | 4.6397 | 71.448 | 2.5932 | 15.371 | 2.1987 | 111.54 | 0.68238 |
| Trial-21 | 0.29228 | 8.7771 | 4.7722 | 23.647 | 10.159 | 145.29 | 4.7336 | 15.913 | 2.4699 | 20.497 | 0.99828 |
| Trial-22 | 0.43695 | 2.7475 | 5.0875 | 23.212 | 4.9754 | 128.75 | 5.9733 | 16.317 | 1.7266 | 45.947 | 1.1197 |
| Trial-23 | 0.3526 | 2.7186 | 5.6397 | 18.244 | 4.924 | 58.212 | 6.4832 | 25.71 | 3.4224 | 109.48 | 1.616 |
| Trial-24 | 0.56646 | 4.1182 | 5.4305 | 14.036 | 4.7912 | 63.491 | 3.2315 | 30.58 | 2.483 | 107.33 | 1.4781 |
| Trial-25 | 0.46526 | 2.666 | 5.3066 | 16.107 | 4.4699 | 53.584 | 4.6861 | 24.275 | 1.6069 | 119.46 | 3.6976 |
| Trial-26 | 0.89472 | 5.6987 | 5.5539 | 20.367 | 8.6828 | 118.05 | 9.2884 | 12.639 | 38.69 | 52.48 | 1.326 |
| Trial-27 | 9.9396 | 2.7152 | 5.4645 | 20.071 | 4.8931 | 117.31 | 6.7634 | 17.116 | 1.2919 | 49.591 | 1.3332 |
| Trial-28 | 0.77139 | 3.6178 | 5.346 | 27.891 | 5.886 | 97.096 | 6.2613 | 10.292 | 1.4452 | 67.753 | 8.1856 |
| Trial-29 | 0.74371 | 3.0909 | 8.2224 | 18.939 | 4.7183 | 148.81 | 5.9633 | 14.263 | 1.6015 | 27.376 | 1.908 |
| Trial-30 | 0.81186 | 4.9195 | 1.2128 | 25 | 6.353 | 99.915 | 6.6602 | 20.507 | 1.4696 | 67.95 | 0.82505 |
| Trial-31 | 0.69849 | 7.8673 | 5.3704 | 21.302 | 8.623 | 127.99 | 6.0676 | 15.978 | 1.2209 | 38.949 | 0.37356 |
| Trial-32 | 0.69914 | 4.7043 | 1.4457 | 16.013 | 4.2167 | 19.368 | 3.5707 | 17.864 | 0.73001 | 154.9 | 14.146 |
| Trial-33 | 1.3518 | 4.2078 | 1.676 | 18.742 | 7.564 | 87.924 | 5.0547 | 16.825 | 0.6864 | 87.439 | 2.5581 |
| Trial-34 | 0.50735 | 6.5201 | 3.764 | 26.209 | 4.3938 | 105.02 | 5.0292 | 18.202 | 0.58359 | 63.907 | 0.73035 |
| Trial-35 | 0.44442 | 5.7165 | 2.1012 | 30.817 | 4.2595 | 116.49 | 5.214 | 17.554 | 0.53569 | 51.896 | 0.7201 |
| Trial-36 | 0.43464 | 7.9769 | 3.5095 | 29.92 | 4.1248 | 94.302 | 3.7313 | 17.666 | 1.7593 | 71.081 | 3.6419 |
| Trial-37 | 0.77145 | 11.883 | 5.6416 | 28.894 | 5.9205 | 113.61 | 3.7406 | 17.306 | 3.4229 | 41.637 | 0.48361 |
| Trial-38 | 0.86549 | 8.9825 | 1.2562 | 24.728 | 9.5357 | 105.09 | 7.4165 | 17.017 | 3.9292 | 58.031 | 0.44616 |
| Trial-39 | 0.8657 | 10.108 | 2.2733 | 23.303 | 4.0866 | 39.709 | 4.1535 | 29.833 | 1.5598 | 117.53 | 2.8995 |
| Trial-40 | 0.68656 | 10.967 | 1.2678 | 25.321 | 5.4487 | 59.16 | 11.594 | 23.838 | 1.9267 | 92.195 | 1.1865 |
| Trial-41 | 0.68873 | 7.1257 | 1.5792 | 18.338 | 4.5053 | 14.369 | 4.7633 | 10.82 | 7.5196 | 158.39 | 6.393 |
| Trial-42 | 0.95881 | 9.5188 | 1.5356 | 21.941 | 11.651 | 74.516 | 5.293 | 11.093 | 2.8564 | 81.595 | 14.762 |
| Trial-43 | 0.74392 | 8.4454 | 1.748 | 25.611 | 4.482 | 99.415 | 6.4448 | 10.563 | 1.2576 | 65.86 | 12.5 |
| Trial-44 | 0.70715 | 13.667 | 1.7365 | 31.08 | 4.6391 | 81.195 | 6.3705 | 13.304 | 1.1402 | 66.245 | 18.015 |
| Trial-45 | 0.69358 | 9.5077 | 2.0456 | 21.186 | 3.8673 | 72.139 | 5.9237 | 22.58 | 1.3324 | 92.298 | 5.6593 |
| Trial-46 | 1.011 | 9.3188 | 1.5274 | 25.621 | 6.5132 | 86.417 | 5.2541 | 13.177 | 1.3185 | 74.574 | 13.709 |
| Trial-47 | 0.718 | 5.417 | 1.7897 | 19.671 | 3.8988 | 41.867 | 3.9469 | 6.9872 | 0.83923 | 122.05 | 26.048 |
| Trial-48 | 0.57058 | 7.0958 | 1.8649 | 26.831 | 4.1323 | 56.438 | 5.7354 | 23.733 | 1.4971 | 99.506 | 6.9696 |
| Trial-49 | 0.44988 | 14.185 | 1.3339 | 28.401 | 7.274 | 76.023 | 7.3095 | 12.079 | 1.6084 | 71.69 | 17.488 |
| Trial-50 | 0.39241 | 12.883 | 9.0005 | 25.429 | 3.7985 | 82.927 | 4.5112 | 11.277 | 1.4051 | 77.292 | 7.8914 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Trial-51 | 0.51803 | 8.8425 | 1.4399 | 19.331 | 3.5621 | 29.671 | 3.5867 | 6.5985 | 1.2333 | 138.44 | 21.375 |
| Trial-52 | 4.437 | 8.8035 | 1.3761 | 24.948 | 4.0945 | 83.648 | 9.118 | 13.46 | 2.3659 | 78.22 | 4.0268 |
| Trial-53 | 0.4396 | 10.163 | 3.7325 | 33.88 | 5.5362 | 119.22 | 4.653 | 14.02 | 2.2862 | 36.428 | 5.7094 |
| Trial-54 | 0.45318 | 8.4458 | 1.9309 | 26.743 | 3.3424 | 111.29 | 4.4266 | 18.274 | 2.9844 | 55.151 | 3.4873 |
| Trial-55 | 0.73384 | 7.6352 | 3.1191 | 22.93 | 6.3444 | 83.543 | 9.6362 | 19.866 | 3.2195 | 75.172 | 4.3502 |
| Trial-56 | 0.465 | 12.794 | 4.9738 | 26.72 | 3.3186 | 81.56 | 4.3364 | 17.369 | 3.5017 | 68.464 | 10.77 |
| Trial-57 | 0.63072 | 8.135 | 1.3522 | 22.362 | 3.4789 | 27.46 | 3.5121 | 13.031 | 2.8881 | 130.31 | 22.526 |
| Trial-58 | 0.85874 | 6.7061 | 1.4281 | 23.641 | 11.488 | 84.421 | 6.7748 | 18.59 | 0.73623 | 77.007 | 5.881 |
| Trial-59 | 0.98869 | 9.9126 | 1.4351 | 23.808 | 5.7931 | 36.657 | 10.877 | 23.209 | 0.86575 | 114.11 | 8.1492 |
| Trial-60 | 1.2901 | 7.4683 | 0.95986 | 29.937 | 3.1159 | 80.429 | 10.742 | 18.516 | 0.79901 | 74.414 | 5.0605 |
| Trial-61 | 1.3074 | 10.47 | 0.66878 | 36.303 | 3.2653 | 97.602 | 5.7886 | 16.689 | 0.98062 | 58.281 | 4.6262 |
| Trial-62 | 2.1523 | 7.317 | 1.4077 | 25.189 | 3.3358 | 37.051 | 14.421 | 17.739 | 3.6736 | 118.75 | 5.2354 |
| Trial-63 | 1.2914 | 7.6744 | 1.3167 | 24.578 | 3.5155 | 25.283 | 5.4551 | 15.628 | 0.78516 | 127.34 | 22.746 |
| Trial-64 | 1.078 | 8.1881 | 1.5384 | 24.831 | 3.4752 | 25.082 | 5.4362 | 23.878 | 0.73663 | 22.353 | 121.62 |
| Trial-65 | 1.0057 | 6.3786 | 1.4503 | 27.894 | 2.9203 | 106.56 | 5.9801 | 16.69 | 0.7608 | 4.8949 | 60.226 |
| Trial-66 | 1.5431 | 14.742 | 0.74332 | 36.542 | 2.6182 | 114.95 | 6.0639 | 14.735 | 0.71139 | 5.7369 | 39.992 |
| Trial-67 | 0.74581 | 16.913 | 5.8483 | 33.866 | 1.6364 | 79.36 | 5.1648 | 14.645 | 0.65439 | 5.6864 | 71.236 |
| Trial-68 | 0.56823 | 6.1542 | 7.1326 | 24.555 | 7.8167 | 112.91 | 5.1353 | 12.201 | 1.4278 | 6.4763 | 50.785 |
| Trial-69 | 2.1039 | 9.0184 | 5.6011 | 24.788 | 5.1067 | 40.786 | 4.6751 | 25.215 | 0.92728 | 14.047 | 105.8 |
| Trial-70 | 2.663 | 8.3798 | 4.6029 | 25.06 | 4.8514 | 40.566 | 6.2359 | 16.583 | 1.1051 | 16.607 | 106.24 |
| Trial-71 | 0.59911 | 12.281 | 4.3117 | 25.242 | 6.1726 | 52.714 | 4.9612 | 13.532 | 1.3949 | 6.3019 | 109.03 |
| Trial-72 | 0.71882 | 10.752 | 5.9573 | 28.262 | 4.498 | 71.504 | 4.5598 | 13.506 | 1.995 | 5.762 | 90.085 |
| Trial-73 | 0.55333 | 10.441 | 3.8676 | 32.223 | 3.6215 | 82.777 | 6.2568 | 9.8513 | 2.2842 | 7.8249 | 77.133 |
| Trial-74 | 0.65565 | 9.2891 | 4.6251 | 31.933 | 4.8301 | 71.384 | 4.769 | 15.567 | 2.2473 | 5.5545 | 87.323 |
| Trial-75 | 0.98859 | 9.7571 | 4.0682 | 29.557 | 6.5494 | 101.29 | 5.9827 | 11.263 | 2.3253 | 5.1005 | 60.631 |
| Trial-76 | 1.6004 | 8.6427 | 6.2318 | 29.008 | 3.3473 | 81.598 | 5.136 | 12.506 | 2.3086 | 40.46 | 45.587 |
| Trial-77 | 0.86886 | 4.8988 | 3.4894 | 18.528 | 1.0871 | 47.916 | 4.8729 | 9.6816 | 1.7471 | 115.8 | 25.868 |
| Trial-78 | 2.1036 | 10.88 | 4.8182 | 35.974 | 1.3252 | 123.36 | 5.3063 | 12.156 | 1.2657 | 36.355 | 4.5127 |
| Trial-79 | 1.0908 | 9.9442 | 3.59 | 26.568 | 2.985 | 63.694 | 7.1568 | 10.197 | 0.75034 | 97.035 | 14.682 |
| Trial-80 | 0.62934 | 6.1358 | 3.0175 | 21.753 | 2.0587 | 18.281 | 3.7656 | 6.4207 | 2.2699 | 88.735 | 84.279 |
| Trial-81 | 0.32161 | 6.7687 | 3.3185 | 32.447 | 2.3366 | 37.095 | 6.6185 | 13.327 | 2.4307 | 14.893 | 108.47 |
| Trial-82 | 9.4433 | 10.874 | 5.0891 | 36.884 | 2.2669 | 111.64 | 6.4878 | 13.266 | 0.55706 | 5.2083 | 35.714 |
| Trial-83 | 1.2619 | 11.59 | 3.8344 | 30.203 | 2.4959 | 101.92 | 9.1475 | 11.497 | 2.1379 | 9.901 | 53.58 |
| Trial-84 | 1.8358 | 12.849 | 8.0692 | 25.931 | 2.6655 | 58.33 | 5.7328 | 13.279 | 0.67793 | 72.016 | 36.416 |
| Trial-85 | 0.77795 | 9.6021 | 5.6561 | 27.282 | 3.8829 | 64.087 | 4.4173 | 17.319 | 1.2264 | 94.21 | 5.9322 |
| Trial-86 | 0.79029 | 6.9401 | 2.8186 | 27.394 | 2.7558 | 94.904 | 4.4216 | 11.378 | 1.7175 | 78.414 | 3.9969 |
| Trial-87 | 0.88131 | 7.0809 | 6.4333 | 32.363 | 2.4442 | 106.37 | 4.8944 | 12.664 | 1.9174 | 56.412 | 5.42 |
| Trial-88 | 0.77373 | 29.642 | 4.2849 | 17.887 | 2.3765 | 98.607 | 8.1474 | 14.131 | 1.6287 | 57.764 | 2.7404 |
| Trial-89 | 0.57856 | 32.907 | 3.4578 | 12.254 | 2.5186 | 76.836 | 12.978 | 9.9368 | 1.1768 | 80.12 | 3.749 |
| Trial-90 | 0.64353 | 25.459 | 8.8871 | 15.678 | 7.8904 | 77.431 | 15.233 | 11.633 | 1.4173 | 68.804 | 5.2323 |
| Trial-91 | 0.77324 | 10.197 | 2.8863 | 28.26 | 2.654 | 108.33 | 14.241 | 3.683 | 0.96064 | 61.147 | 4.0356 |
| Trial-92 | 0.64282 | 18.634 | 11.092 | 27.437 | 2.6558 | 94.271 | 9.3871 | 4.3122 | 5.6488 | 54.589 | 7.8624 |
| Trial-93 | 0.75622 | 14.132 | 2.8158 | 27.172 | 2.1886 | 57.256 | 12.088 | 9.0831 | 5.8142 | 96.669 | 8.9404 |
| Trial-94 | 0.47659 | 11.452 | 5.7424 | 30.047 | 3.8721 | 73.742 | 14.042 | 3.8497 | 0.8704 | 88.428 | 5.8177 |
| Trial-95 | 0.34226 | 12.922 | 2.9521 | 23.965 | 3.1172 | 119.26 | 8.6446 | 11.527 | 0.51885 | 53.182 | 2.0366 |
| Trial-96 | 0.3685 | 8.3236 | 8.2485 | 28.699 | 2.0603 | 53.283 | 13.703 | 3.3166 | 1.0474 | 99.31 | 18.816 |
| Trial-97 | 0.29736 | 7.9113 | 5.891 | 28.314 | 5.663 | 87.792 | 11.445 | 5.9254 | 2.5586 | 73.73 | 5.1401 |
| Trial-98 | 0.96084 | 10.06 | 1.8365 | 21.253 | 1.7463 | 31.199 | 2.8384 | 21.967 | 1.2257 | 140.72 | 2.4802 |
| Trial-99 | 1.3822 | 20.205 | 7.229 | 23.825 | 5.1525 | 94.16 | 6.77 | 15.763 | 1.0064 | 56.672 | 3.9272 |
| Trial- | 1.401 | 31.453 | 3.7821 | 19.921 | 4.5796 | 122.07 | 6.4668 | 11.795 | 0.8108 | 34.298 | 1.686 |
| Median | 0.83 | 8.82 | 3.39 | 24.76 | 4.43 | 85.42 | 5.94 | 15.59 | 1.56 | 66.05 | 5.19 |

| Lucent Channel | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trial-1 | 10.46 | 61.30 | 0.16 | 41.27 | 0.22 | 104.50 | 0.70 | 1.27 | 2.54 | 0.05 | 0.12 |
| Trial-2 | 0.41 | 20.50 | 0.09 | 50.54 | 0.22 | 155.92 | 0.42 | 0.74 | 2.69 | 1.29 | 0.11 |
| Trial-3 | 0.45 | 50.57 | 0.30 | 21.27 | 0.22 | 144.62 | 0.44 | 0.95 | 2.66 | 11.16 | 0.11 |
| Trial-4 | 0.45 | 40.91 | 20.41 | 60.69 | 0.20 | 105.31 | 1.04 | 0.85 | 2.73 | 0.19 | 0.10 |
| Trial-5 | 0.44 | 38.64 | 0.22 | 30.48 | 0.20 | 148.44 | 1.32 | 0.14 | 2.16 | 0.42 | 0.12 |
| Trial-6 | 0.40 | 30.64 | 30.45 | 62.37 | 0.22 | 83.26 | 1.41 | 0.10 | 3.03 | 0.33 | 0.09 |
| Trial-7 | 0.31 | 2.35 | 1.74 | 5.22 | 0.23 | 8.12 | 38.90 | 10.50 | 116.88 | 49.17 | 0.08 |
| Trial-8 | 0.18 | 30.42 | 30.50 | 46.95 | 10.33 | 98.81 | 1.45 | 0.14 | 2.81 | 11.07 | 0.07 |
| Trial-9 | 10.23 | 40.56 | 30.52 | 52.49 | 0.26 | 93.65 | 1.09 | 0.15 | 2.96 | 0.76 | 0.06 |
| Trial-10 | 30.34 | 0.07 | 10.27 | 58.50 | 0.26 | 87.35 | 31.98 | 0.15 | 3.03 | 0.36 | 29.55 |
| Trial-11 | 1.59 | 22.36 | 0.97 | 5.30 | 0.24 | 8.27 | 29.07 | 0.16 | 135.85 | 28.83 | 0.06 |
| Trial-12 | 0.16 | 0.08 | 44.47 | 111.63 | 0.25 | 40.31 | 11.26 | 0.10 | 2.99 | 0.71 | 0.05 |
| Trial-13 | 10.17 | 10.25 | 0.23 | 144.98 | 0.21 | 61.14 | 0.98 | 0.11 | 3.77 | 1.05 | 0.05 |
| Trial-14 | 20.21 | 0.07 | 10.21 | 144.46 | 10.18 | 0.26 | 1.04 | 0.34 | 14.14 | 0.79 | 0.05 |
| Trial-15 | 0.19 | 0.06 | 0.88 | 12.91 | 0.21 | 0.96 | 10.92 | 0.11 | 135.24 | 40.97 | 0.04 |
| Trial-16 | 30.07 | 30.19 | 20.13 | 114.30 | 20.15 | 0.29 | 0.46 | 0.22 | 4.12 | 12.75 | 0.04 |
| Trial-17 | 10.20 | 51.17 | 30.16 | 42.81 | 0.21 | 86.86 | 1.04 | 0.87 | 3.64 | 0.73 | 5.30 |
| Trial-18 | 0.20 | 0.93 | 0.11 | 4.57 | 0.17 | 20.83 | 19.72 | 19.42 | 145.72 | 17.62 | 3.46 |
| Trial-19 | 0.81 | 2.29 | 1.38 | 4.61 | 0.19 | 6.55 | 10.14 | 28.98 | 126.49 | 30.61 | 0.04 |
| Trial-20 | 29.98 | 40.57 | 0.13 | 44.66 | 0.20 | 89.59 | 0.82 | 1.50 | 3.53 | 1.39 | 0.04 |
| Trial-21 | 19.96 | 50.26 | 19.98 | 75.27 | 0.19 | 58.61 | 0.75 | 0.23 | 4.78 | 2.66 | 0.04 |
| Trial-22 | 1.86 | 40.61 | 0.23 | 70.74 | 0.21 | 111.58 | 0.46 | 1.13 | 4.61 | 1.56 | 0.02 |
| Trial-23 | 1.34 | 2.40 | 2.19 | 6.56 | 0.19 | 4.77 | 29.30 | 19.59 | 156.64 | 0.05 | 0.03 |
| Trial-24 | 10.07 | 10.36 | 0.14 | 40.09 | 8.10 | 157.24 | 0.49 | 1.36 | 4.89 | 0.01 | 0.30 |
| Trial-25 | 10.11 | 40.33 | 10.19 | 71.86 | 0.19 | 82.54 | 1.25 | 1.03 | 4.77 | 10.42 | 0.05 |
| Trial-26 | 0.16 | 40.28 | 10.14 | 92.27 | 0.20 | 81.68 | 1.01 | 2.07 | 3.97 | 0.66 | 0.31 |
| Trial-27 | 1.39 | 0.33 | 0.12 | 3.39 | 0.19 | 12.36 | 10.10 | 126.95 | 49.58 | 19.35 | 9.65 |
| Trial-28 | 11.81 | 60.47 | 0.17 | 10.28 | 20.10 | 122.07 | 0.46 | 4.73 | 2.01 | 0.90 | 0.04 |
| Trial-29 | 10.00 | 0.14 | 0.18 | 53.77 | 0.23 | 161.20 | 0.82 | 4.92 | 1.68 | 0.06 | 0.01 |
| Trial-30 | 20.00 | 0.14 | 20.14 | 10.22 | 69.91 | 64.85 | 0.94 | 3.84 | 0.69 | 0.61 | 0.05 |
| Trial-31 | 1.35 | 12.05 | 2.14 | 0.91 | 4.16 | 6.15 | 19.60 | 135.94 | 38.68 | 1.41 | 0.01 |
| Trial-32 | 0.10 | 10.66 | 0.10 | 2.09 | 30.19 | 173.07 | 1.20 | 4.17 | 1.07 | 0.01 | 0.03 |
| Trial-33 | 10.11 | 0.15 | 20.11 | 25.87 | 41.03 | 88.16 | 0.49 | 3.55 | 1.85 | 41.35 | 0.05 |
| Trial-34 | 20.07 | 0.09 | 0.21 | 10.26 | 51.00 | 144.18 | 0.46 | 4.37 | 0.78 | 1.55 | 0.06 |
| Trial-35 | 0.10 | 0.03 | 0.87 | 1.63 | 3.61 | 8.82 | 21.07 | 110.63 | 36.47 | 0.03 | 19.16 |
| Trial-36 | 11.84 | 0.07 | 0.14 | 11.00 | 28.22 | 174.54 | 0.53 | 4.23 | 0.93 | 1.46 | 0.02 |
| Trial-37 | 20.08 | 0.07 | 30.26 | 0.31 | 41.15 | 94.00 | 1.37 | 3.36 | 10.99 | 0.09 | 0.04 |
| Trial-38 | 0.73 | 24.30 | 0.11 | 0.94 | 6.17 | 4.95 | 19.74 | 127.52 | 48.06 | 0.11 | 0.05 |
| Trial-39 | 2.02 | 1.54 | 0.13 | 0.95 | 2.25 | 11.80 | 0.62 | 136.77 | 19.68 | 57.63 | 0.07 |
| Trial-40 | 0.14 | 20.80 | 0.11 | 20.30 | 23.89 | 161.60 | 1.40 | 3.79 | 0.79 | 0.07 | 0.09 |
| Trial-41 | 10.08 | 0.20 | 0.08 | 38.20 | 60.07 | 117.18 | 1.06 | 4.11 | 1.85 | 0.07 | 0.10 |
| Trial-42 | 1.43 | 21.45 | 0.08 | 1.72 | 2.88 | 9.65 | 10.33 | 48.22 | 136.80 | 0.06 | 0.12 |
| Trial-43 | 0.80 | 14.50 | 0.88 | 1.13 | 4.25 | 6.20 | 29.53 | 38.60 | 136.64 | 0.06 | 0.13 |
| Trial-44 | 20.12 | 10.00 | 20.11 | 0.50 | 71.02 | 63.77 | 11.06 | 1.60 | 3.32 | 0.04 | 0.14 |
| Trial-45 | 20.21 | 0.02 | 20.23 | 10.46 | 60.42 | 74.79 | 11.03 | 1.28 | 22.82 | 0.95 | 0.16 |
| Trial-46 | 0.86 | 0.83 | 0.15 | 1.79 | 10.86 | 4.94 | 0.71 | 19.19 | 117.29 | 76.71 | 0.16 |
| Trial-47 | 10.21 | 30.53 | 20.23 | 0.52 | 50.45 | 94.76 | 1.28 | 0.38 | 3.06 | 0.56 | 0.35 |
| Trial-48 | 10.24 | 0.01 | 20.26 | 10.48 | 21.19 | 123.97 | 1.04 | 0.37 | 1.53 | 2.36 | 0.16 |
| Trial-49 | 0.21 | 20.71 | 0.19 | 10.51 | 53.01 | 142.61 | 1.29 | 0.37 | 1.77 | 2.15 | 0.16 |
| Trial-50 | 0.90 | 3.14 | 2.45 | 1.17 | 1.80 | 10.16 | 19.71 | 19.20 | 85.81 | 88.24 | 0.14 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trial-51 | 0.21 | 20.71 | 0.20 | 10.52 | 53.35 | 132.96 | 0.92 | 0.48 | 1.38 | 1.75 | 0.14 |
| Trial-52 | 0.19 | 21.75 | 0.11 | 1.29 | 1.49 | 3.48 | 10.51 | 0.23 | 99.59 | 83.61 | 0.13 |
| Trial-53 | 1.60 | 0.06 | 19.38 | 19.65 | 23.03 | 153.21 | 0.61 | 0.20 | 1.49 | 14.00 | 0.13 |
| Trial-54 | 0.48 | 1.07 | 0.12 | 0.51 | 1.47 | 5.02 | 0.72 | 0.18 | 10.25 | 212.79 | 0.11 |
| Trial-55 | 0.77 | 0.06 | 0.53 | 0.77 | 1.78 | 24.94 | 0.66 | 0.21 | 121.05 | 81.86 | 0.11 |
| Trial-56 | 0.37 | 0.07 | 0.81 | 1.07 | 1.75 | 3.46 | 0.71 | 10.11 | 10.23 | 204.37 | 0.10 |
| Trial-57 | 9.73 | 9.69 | 0.24 | 10.08 | 29.27 | 157.90 | 0.71 | 0.22 | 0.82 | 13.99 | 0.09 |
| Trial-58 | 0.45 | 0.07 | 0.89 | 0.82 | 1.64 | 4.20 | 0.65 | 0.21 | 21.67 | 202.38 | 0.09 |
| Trial-59 | 0.44 | 20.88 | 0.15 | 0.77 | 1.31 | 15.87 | 20.42 | 10.08 | 69.57 | 93.15 | 0.08 |
| Trial-60 | 0.17 | 0.91 | 0.08 | 1.04 | 0.68 | 16.58 | 40.32 | 10.06 | 69.55 | 93.20 | 0.10 |
| Trial-61 | 1.65 | 40.19 | 0.14 | 19.85 | 32.96 | 105.00 | 1.71 | 0.66 | 4.96 | 5.38 | 0.09 |
| Trial-62 | 0.94 | 0.08 | 1.02 | 0.86 | 3.09 | 3.65 | 0.68 | 9.97 | 19.78 | 193.04 | 0.08 |
| Trial-63 | 0.20 | 12.22 | 0.52 | 1.23 | 1.91 | 4.75 | 30.16 | 19.79 | 59.20 | 92.34 | 0.07 |
| Trial-64 | 0.17 | 60.45 | 0.14 | 10.17 | 37.19 | 112.63 | 1.62 | 1.62 | 3.68 | 5.50 | 0.07 |
| Trial-65 | 0.16 | 50.11 | 7.87 | 39.29 | 34.66 | 78.43 | 1.59 | 0.68 | 3.70 | 6.40 | 0.05 |
| Trial-66 | 0.51 | 0.10 | 0.18 | 1.22 | 1.59 | 8.48 | 0.57 | 9.97 | 0.24 | 210.26 | 0.04 |
| Trial-67 | 0.13 | 21.56 | 0.14 | 0.82 | 2.72 | 5.82 | 30.11 | 13.63 | 69.11 | 88.63 | 0.03 |
| Trial-68 | 0.13 | 9.77 | 9.96 | 19.89 | 31.11 | 149.99 | 2.21 | 1.13 | 4.10 | 4.95 | 0.04 |
| Trial-69 | 0.15 | 97.42 | 0.20 | 0.23 | 40.66 | 79.59 | 0.66 | 0.32 | 0.12 | 13.91 | 0.02 |
| Trial-70 | 0.15 | 10.66 | 0.13 | 0.25 | 1.53 | 17.94 | 30.20 | 0.78 | 79.04 | 92.04 | 0.02 |
| Trial-71 | 0.16 | 1.22 | 0.52 | 0.69 | 0.78 | 27.14 | 40.04 | 0.13 | 29.91 | 112.38 | 19.74 |
| Trial-72 | 0.20 | 60.33 | 0.13 | 0.27 | 48.91 | 100.57 | 0.58 | 0.23 | 5.39 | 5.25 | 1.06 |
| Trial-73 | 0.18 | 19.70 | 0.06 | 0.28 | 46.73 | 141.84 | 0.54 | 0.27 | 9.50 | 2.76 | 1.15 |
| Trial-74 | 0.16 | 11.75 | 0.25 | 0.14 | 1.98 | 6.91 | 30.00 | 0.24 | 150.07 | 21.36 | 9.89 |
| Trial-75 | 0.22 | 12.74 | 0.67 | 0.10 | 2.00 | 5.14 | 20.18 | 10.05 | 171.16 | 0.10 | 0.06 |
| Trial-76 | 0.19 | 39.22 | 0.26 | 0.17 | 19.88 | 160.56 | 2.47 | 0.68 | 7.34 | 2.44 | 0.02 |
| Trial-77 | 0.19 | 19.91 | 0.23 | 0.15 | 67.08 | 132.70 | 0.56 | 0.08 | 8.75 | 3.54 | 0.02 |
| Trial-78 | 0.57 | 0.08 | 1.19 | 0.59 | 2.26 | 26.21 | 79.32 | 0.10 | 19.96 | 102.43 | 0.02 |
| Trial-79 | 0.20 | 1.77 | 0.47 | 0.59 | 1.83 | 6.52 | 10.45 | 0.12 | 0.14 | 207.38 | 3.71 |
| Trial-80 | 0.19 | 19.68 | 0.44 | 0.17 | 62.56 | 127.05 | 5.78 | 0.14 | 1.12 | 5.76 | 0.04 |
| Trial-81 | 19.65 | 69.72 | 0.26 | 0.21 | 48.92 | 71.77 | 3.69 | 1.09 | 2.09 | 5.49 | 0.05 |
| Trial-82 | 0.18 | 0.19 | 0.36 | 0.20 | 3.77 | 7.28 | 20.26 | 0.11 | 9.98 | 190.80 | 0.05 |
| Trial-83 | 0.20 | 0.96 | 0.78 | 0.22 | 1.78 | 7.99 | 0.67 | 0.14 | 10.08 | 210.32 | 0.05 |
| Trial-84 | 0.18 | 19.99 | 0.24 | 0.17 | 11.98 | 178.01 | 5.49 | 0.14 | 0.80 | 5.86 | 0.05 |
| Trial-85 | 0.25 | 2.07 | 0.24 | 0.19 | 2.79 | 4.45 | 108.97 | 0.16 | 10.17 | 82.75 | 0.06 |
| Trial-86 | 0.25 | 0.59 | 1.99 | 0.19 | 2.77 | 3.81 | 0.63 | 0.14 | 0.34 | 222.33 | 0.08 |
| Trial-87 | 0.23 | 12.81 | 0.71 | 0.55 | 3.18 | 3.51 | 77.45 | 9.95 | 29.85 | 94.43 | 0.07 |
| Trial-88 | 0.21 | 19.90 | 0.27 | 0.19 | 19.64 | 170.52 | 6.13 | 1.30 | 0.14 | 4.54 | 0.07 |
| Trial-89 | 0.20 | 53.23 | 0.31 | 0.15 | 46.73 | 99.33 | 5.68 | 1.25 | 0.16 | 5.45 | 0.08 |
| Trial-90 | 0.20 | 4.21 | 0.68 | 0.22 | 3.23 | 3.28 | 39.99 | 0.23 | 0.17 | 180.88 | 0.08 |
| Trial-91 | 0.18 | 10.48 | 1.27 | 0.23 | 3.62 | 15.35 | 108.87 | 0.22 | 9.97 | 82.44 | 0.09 |
| Trial-92 | 1.65 | 59.73 | 19.99 | 0.21 | 49.24 | 89.12 | 4.93 | 0.67 | 1.62 | 5.99 | 0.09 |
| Trial-93 | 0.50 | 13.19 | 0.87 | 0.20 | 2.39 | 3.46 | 126.79 | 10.09 | 9.98 | 65.13 | 0.09 |
| Trial-94 | 0.60 | 0.09 | 1.14 | 0.29 | 1.61 | 7.31 | 28.80 | 0.27 | 0.15 | 192.79 | 0.09 |
| Trial-95 | 0.55 | 11.82 | 1.52 | 0.22 | 1.98 | 4.42 | 99.34 | 10.77 | 10.00 | 91.97 | 0.09 |
| Trial-96 | 9.86 | 40.96 | 29.54 | 0.21 | 66.42 | 73.03 | 5.43 | 0.27 | 1.20 | 6.26 | 0.09 |
| Trial-97 | 0.60 | 2.06 | 1.24 | 0.09 | 1.60 | 4.01 | 89.54 | 10.02 | 20.54 | 82.26 | 0.07 |
| Trial-98 | 0.88 | 1.78 | 1.14 | 0.13 | 0.85 | 4.81 | 20.49 | 0.13 | 0.23 | 202.61 | 0.05 |
| Trial-99 | 0.22 | 2.42 | 0.86 | 0.09 | 2.17 | 3.45 | 89.72 | 0.13 | 29.88 | 83.11 | 0.04 |
| Trial- | 29.85 | 10.63 | 0.47 | 0.26 | 56.08 | 122.21 | 5.85 | 0.11 | 0.20 | 7.65 | 0.04 |
| Median | 0.51 | 10.66 | 0.53 | 1.26 | 2.78 | 62.45 | 1.66 | 0.86 | 4.69 | 5.92 | 0.08 |

**APPENDIX G: MEDIAN OF MEDIAN DWELL TIME**


This appendix includes the tables showing the median of the median dwell time for all the 100

trials and for each of the 11 channels.

**Median of Median Dwell Time**

| Channels | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Airlink | 0.00335 | 0.00111 | 0.00095 | 0.01131 | 0.01528 | 0.00105 | 0.00314 | 0.00152 | 0.00157 | 0.00251 | 0.00316 |
| D-Link | 0.01139 | 0.02292 | 0.04707 | 0.39028 | 0.03183 | 0.03147 | 0.01348 | 0.62015 | 0.04805 | 0.03318 | 0.03192 |
| Intel | 0.00159 | 0.00205 | 0.00288 | 0.00125 | 0.01036 | 0.00633 | 0.00117 | 0.00204 | 0.00204 | 0.00077 | 0.00548 |
| Link-P | 0.01558 | 0.01841 | 0.04900 | 0.87330 | 0.02751 | 0.03274 | 0.01606 | 0.07793 | 0.04714 | 0.03294 | 0.02969 |
| Link-H | 0.00236 | 0.00163 | 0.00087 | 0.00637 | 0.00096 | 0.00644 | 0.00558 | 0.00263 | 0.00175 | 0.00559 | 0.00124 |
| Cisco | 0.00110 | 0.00103 | 0.00177 | 0.02168 | 0.00335 | 0.00191 | 0.00144 | 0.00183 | 0.00080 | 0.02435 | 0.00216 |
| Lucent | 0.00099 | 0.00101 | 0.00076 | 0.00145 | 0.00204 | 0.00159 | 0.00288 | 0.00073 | 0.00306 | 0.00217 | 0.00099 |