LOG DATA TRAFFIC CHARACTERIZATION FOR PACKET LOSS ESTIMATION IN ALICE O^2 SYSTEM

MS. NAPATSORN PITAKKOTCHAKORN

A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF ENGINEERING
(COMPUTER ENGINEERING)
FACULTY OF ENGINEERING
KING MONGKUT'S UNIVERSITY OF TECHNOLOGY THONBURI
2020

Log Data Traffic Characterization for Packet Loss Estimation in Alice O^2 System

Ms. Napatsorn Pitakkotchakorn B. Eng. (Computer Engineering)

A Thesis Submitted in Partial Fulfillment
of the Requirement for
the Degree of Master of Engineering (Computer Engineering)
Faculty of Engineering
King Mongkut's University of Technology Thonburi
2020

Thesis Committee

..... Chairman of Thesis Commitee
(Asst. Prof. Phongsak Keeratiwintakorn, Ph.D.)

..... Member and Thesis Advisor
(Assoc. Prof. Peerapon Siripongwutikorn, Ph.D.)

..... Member
(Asst. Prof. Khajonpong Akkarajitsakul, Ph.D.)

..... Member
(Asst. Prof. Phond Phunchongharn, Ph.D.)

..... Member
(Assoc. Prof. Anan Banharnsakun, Ph.D.)

Thesis Title	Log Data Traffic Characterization for Packet Loss Estimation in ALICE O^2 System
Thesis Credits	12
Candidate	Ms. Napatsorn Pitakkotchakorn
Thesis Advisor	Assoc. Prof. Peerapon Siripongwutikorn, Ph.D.
Program	Master of Engineering
Field of Study	Computer Engineering
Department	Computer Engineering
Faculty	Engineering
Academic Year	2020

Abstract

Loss estimation is considerably significant for network planning processes and plays a main role in bandwidth allocation optimization, network design, guaranteeing quality of service (QoS), etc. According to The European Organization for Nuclear Research (CERN), the ALICE O2 computing system has nodes, called First Level Processors (FLPs), which collect particle interaction data from ALICE detectors and carry out local processing. Log data generated by tasks running on FLPs are sent over a network to the Logstash. The log is then filtered and sent to the Elasticsearch and Kibana for future anomaly detection. Large amounts of log-data traffic from FLPs over this network could lead to packet loss. In this research, we create FLPs in a testbed environment to characterize the log-data traffic generated by tasks in FLPs and fit the data to time-series models and probability distributions assuming independent interarrival times. The fitted models are then used to study end-to-end packet loss with input traffic from a large number of FLPs in a network of switches. The simulation results can help predict the number of FLPs and traffic intensity that the network can sustain for different kinds of tasks running on FLPs. Lastly, in order to find the best represented model compared to the real trace result, we performed model verification and took into account the end-to-end packet loss and queue utilization of each task.

Keywords: Network Resource Planning/ Traffic Model/ Queuing Network/ Stochastic Model

หัวข้อวิทยานิพนธ์	การศึกษาลักษณะข้อมูลจราจรเพื่อประมาณการสูญหายของข้อมูลในระบบ ALICE O^2
หน่วยกิต	12
ผู้เขียน	นางสาวนภัสสร พิทักษ์กชกร
อาจารย์ที่ปรึกษา	รศ.ดร.พีรพล ศิริพงศ์วุฒิกร
หลักสูตร	วิศวกรรมศาสตรมหาบัณฑิต
สาขาวิชา	วิศวกรรมคอมพิวเตอร์
ภาควิชา	วิศวกรรมคอมพิวเตอร์
คณะ	คณะวิศวกรรมศาสตร์
ปีการศึกษา	2563

บทคัดย่อ

การประมาณการทรัพยากรเครือข่ายและการสูญหายของข้อมูลมีความสำคัญอย่างมากในการวางแผนเครือข่าย โดยมีบทบาทสำคัญในการเพิ่มประสิทธิภาพการจัดสรรแบนด์วิดท์ การออกแบบเครือข่าย การรับประกันคุณภาพการบริการ (QoS) ฯลฯ ตามข้อมูลจาก CERN ในระบบประมวลผล O^2 ของ ALICE นั้นประกอบด้วยโหนดที่เรียกว่า First Level Processors (FLPs) ซึ่งทำหน้าที่รวบรวมข้อมูลปฏิสัมพันธ์ของอนุภาคจากเครื่องตรวจจับ ALICE และส่งต่อข้อมูลเพื่อใช้ในการประมวลผล ข้อมูลจราจรที่ถูกบันทึกโดยการรันงานแต่ละประเภทบนเครื่อง FLPs นั้น จะถูกส่งผ่านเครือข่ายไปยังเครื่อง Logstash จากนั้นจะถูกฟิลเตอร์ด้วย Logstash เหลือเพียงข้อมูลส่วนที่จำเป็นเท่านั้นและจะถูกส่งต่อไปยัง Elastic search และ Kibana เพื่อใช้ในการตรวจจับความผิดปกติของ FLPs การรับส่งข้อมูลบันทึกจราจรจำนวนมากจาก FLPs บนเครือข่าย อาจนำไปสู่การสูญหายข้อมูลได้ ซึ่งในงานวิจัยนี้เราได้สร้าง FLPs ในระบบจำลองตามสภาพแวดล้อมจริง เพื่อใช้ในการศึกษาลักษณะการรับส่งข้อมูลบันทึกจราจรที่สร้างโดยการรันงานแต่ละประเภทบนเครื่อง FLPs จากนั้นนำผลที่ได้จากการศึกษามาทดสอบกับแบบจำลองอนุกรมเวลาและการแจกแจงความน่าจะเป็น โดยสมมติว่าช่วงเวลาการเข้ามาถึงระหว่างแพ็กเก็ตนั้นเป็นอิสระ แบบจำลองเหล่านั้นจะถูกนำมาใช้เพื่อศึกษาการสูญเสียแพ็กเก็ต ผลที่ได้จากการจำลองนั้นจะช่วยชี้แนะจำนวน FLPs และความหนาแน่นของการรับส่งข้อมูลที่เครือข่ายสามารถรองรับงานประเภทต่าง ๆ ที่ทำงานบน FLPs ได้ ในขั้นตอนสุดท้ายจะเปรียบเทียบผลลัพธ์ที่ได้จากการจำลองกับข้อมูลจริงโดยคำนึงถึงการสูญเสียของแพ็กเก็ตและภาระงานของคิวของแต่ละงาน เพื่อค้นหาแบบจำลองที่เป็นตัวแทนที่ดีที่สุด

คำสำคัญ: การวางแผนทรัพยากรเครือข่าย/ แบบจำลองการรับส่งข้อมูล/ ทฤษฎีแถวคอยในระบบเครือข่าย/ แบบจำลองแบบสุ่ม

ACKNOWLEDGMENTS

Many people assisted and collaborated in the completion of this thesis. I would like to express my gratitude to each and every one of them.

It gives me great pleasure to share my heartfelt appreciation to my mentor and all those who helped with this project. My mentor, Assoc. Prof. Peerapon Siripongwutikorn, a professor at the Computer Engineering Department, Faculty of Engineering, King Mongkut's University of Technology Thonburi, showed a genuine concern in my study throughout. I was able to finish my research thanks to his indispensable encouragement, insightful feedback, generosity, and optimism.

I would also like to express my sincere gratitude to the board members, especially Asst. Prof. Phond Phunchongharn, Asst. Prof. Khajonpong Akkarajitsakul, Asst. Prof. Phongsak Keeratiwintakorn, and Assoc. Prof. Anan Banharnsakun, for their sound guidance and extensive knowledge. In addition, I want to express my appreciation to everyone on the CERN ALICE O2 team and the KMUTT AI-based logging system team, particularly Vasco Chibante Barroso, for their invaluable counsel and encouragement.

I am also indebted to Rudee Chutijiranard and other officials for their support and patience during this process. Last but not least, I would like to express my thankfulness to my parents and my friends for providing me with their endless encouragement and guidance.

CONTENTS

PAGE

LIST OF TABLES

TABLE **PAGE**

LIST OF TABLES (Cont'd)

TABLE **PAGE**

LIST OF FIGURES

FIGURE **PAGE**

LIST OF FIGURES (Cont'd)

FIGURE **PAGE**

CHAPTER 1 INTRODUCTION

1.1 Background

CERN (The European Organization for Nuclear Research) was established in the 1950s and is one of the most famous organizations that performs research and experiments in the field of particle physics. Today it is known as the European Laboratory for Particle Physics. CERN aims to understand the nature of universe such as how the universe began or how the particles interact with each other which could lead to new discoveries.

To find out how particles interact with each other, CERN built the Large Hadron Collider (LHC) deep underground in France and Switzerland. The LHC is the largest and the most powerful particle accelerator in the world. The machine accelerates ions at a velocity approaching the speed of light. The accelerated ions will collide with each other and the result is recorded. The data gathered from the LHC is used in further experiments. Scientists hope to learn more about how the universe began to make new discoveries.

The LHC consists of 4 main particle detector bases. One of the particle detector bases is A Large Ion Collider Experiment (ALICE), a heavy ion detector. During the latest maintenance break (2018-2022), the ALICE experiment received a significant upgrade [1] to increase the capability of the data collection process in order to collect collision data at a rate of 50 kHz for minimal bias Pb-Pb and 200 kHz for pp and p-Pb collisions. Thus, ALICE has designed new facilities to support data gathering.

A new Online-Offline (O2) computing system [2] has been developed to sustain the large detector data input. It is composed of more than 500 nodes in charge of collecting, aggregating, and processing the data. The system contains a set of 200 nodes called First Level Processor (FLP) that collects data of particle interactions from the detector at a rate of 3.4 TB/s. The data is then sent to a second group of machines, the Event Processing Nodes (EPNs), for global aggregation and processing before being recorded for further analysis. The system aims to reduce the detector readout volume in order to minimize the cost and requirements for data processing and storage on the computing system.

CERN and King Mongkut's University of Technology Thonburi (KMUTT) have collaborated to come up with a future AI-based logging system for ALICE O2 facilities. The main role of the AI-based logging system is to utilize logged data generated from the components to monitor and identify the events registering as normal or abnormal. The system uses the ELK Stack (Elasticsearch, Logstash, and Kibana), which is one of the most popular open-source software for log management platforms. This research focuses on network resource estimation for such a system by collecting the network logs on the FLPs. Packetbeat, which is a log-shipper, is used as a helper in network analysis for monitoring and capturing the network traffic.

1.2 Motivation

The ALICE O^2 system is different from similar systems and ALICE experiment complexity is directly proportional to data. ALICE uses rapidly changing and abundant information, which could cause incomplete experiment data which in turn directly affects the analysis process with any previously installed AI-based logging system. Thus, the AI-based logging system based on ALICE O^2 needs to first be tested with simulations in order to estimate network resources before being installed in the production.

Loss estimation is considerably significant for network planning processes and plays a main role in bandwidth allocation optimization, network design, guaranteeing quality of service (QoS), etc. This thesis is a part of a collaboration between King Mongkut’s University of Technology Thonburi and CERN which aims to examine the performance of various mathematical models in representing network traffic data by comparing time-series models and distribution models.

1.3 Research Objective

Since huge amounts of data from FLPs will be continuously sent over a local area network to the Logstash server, packet losses in the network can adversely affect experimental result analysis due to incomplete data. Services running on FLPs may also generate log data with unanticipated traffic characteristics. Our objective is to examine packet loss performance under varying conditions in terms of the number of FLPs and characteristics of generated log traffic to determine conditions at which the network can sustain negligible or no data loss.

Due to restrictions from accessing the production facilities at CERN, a few numbers of FLPs are installed in an OpenStack testbed environment and traffic data generated by FLPs is collected by using PacketBeat. So, determining the distribution of network traffic data that collected from Packetbeat is significant. The traffic data is then fitted to various traffic-source models that will be used to generate inputs to the simulation models.

1.4 Research Scope

1. Only one Logstash server was considered, which is the worst-case scenario of multi-servers as traffic would be concentrated to a single bottleneck switch in the network.
2. Due to flooding log traffic data from the FLPs to the Logstash server, only the losses that occur between the FLPs and the Logstash server are focused on.
3. Using OpenStack-based CERN Cloud infrastructure and Linux CentOS 7 images, all instances of FLPs were created with 4 VCPUs, 7.3 GB of memory, and 40 GB of disk space
4. Variables considered for performance modeling are link capacities in the network, interarrival time, buffer size and fixed packet size.
5. Multiple types of probability distributions are considered in the stochastic distribution model including the time-series model, exponential distribution, and Pareto distribution.

1.5 Expected Benefits

Because of resource limitations in the testbed environment, the number of nodes that can be created and simulated is limited to only a few nodes. Hence, the simulation model needs to be developed with OMNET++ based on the collected data instead. In the simulation, hundreds and thousands of FLPs nodes were built to simulate an environment that was similar to the production. The simulation model that can efficiently represent input traffic data so that the suitable packet buffer capacity and bandwidth can be found before being installed in the production will efficiently provide good quality of service (QoS). Moreover, our results will help predict the sustainability regarding the number of FLPs running different services for system expansion and how much traffic intensity of log data generated by FLPs the system can support in the future.

CHAPTER 2 LITERATURE REVIEW AND THEORY

The O^2 environment and logging scheme, the study of traffic flow, and queuing analysis are three key topics that need to be recalled and clearly understood in order to perform network resource and loss estimation.

2.1 O^2 Environment and Logging Scheme

The Alice Online and Offline computing system (O^2) conducts physical tests and collects results. Thus, O^2 requires a software framework and a common computing facility for both data collection and processing. The O^2 computing system consists of two categories of computing nodes as shown in Figure 2.1. Each one is responsible for different data collection. The first level processor (FLP) collects data from the detector at the rate of 3.2 Gb/s per FLP node, or at rate 1.1 TB/s in total [3]. The stream data will then be analyzed by the Event Processing Nodes (EPNs) for aggregation and will be used in experiments done by scientists. The O^2 facility consists of 250 FLPs and 1500 EPNs. This research will focus on the FLP side and ignore the EPN side. The FLPs will be the primary target of the logging scheme. The log data from the FLPs will be compiled and sent to the log analysis tool for analysis and visualization.

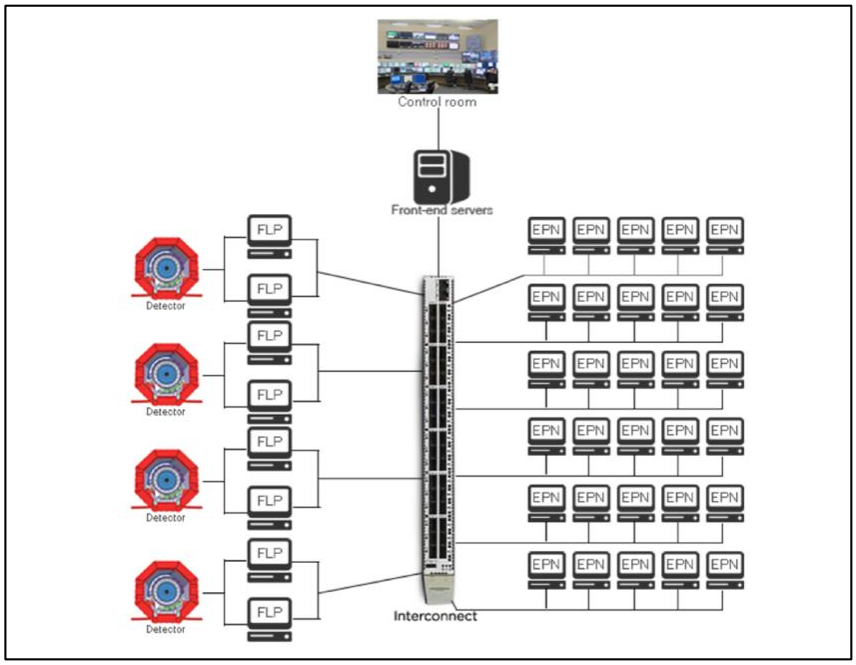


Figure 2.1 O^2 environment

2.2 Traffic Distribution

The study of traffic distribution is vital for network analysis and resource estimation as it describes the characteristics of the network. Errors in estimation are caused when traffic distribution is not analyzed carefully. The recent study of traffic models has shown that the self-similarity, long-range dependence, and burstiness properties of network traffic are crucial in the study of network traffic characteristics. Chandrasekaran [4] studied several explanations for common traffic stream models such as Poisson, Pareto, Markov, and embedded Markov Models in order to help understand the flow of traffic in the network as well as prove how the model closely represents the real-time characteristics of the network. For the network capacity model in social opportunistic networks, Soelistijanto and Howarth [5] assumed the Poisson distribution and node independence. The simulation generated a network with 100 nodes and increased the node count until 1000 nodes are applied in order to find the load distribution for both binary and weighted networks.

In order to help the providers characterize network resource usage and improve the performance of network and infrastructure planning, Baris et al. [6] assessed the characteristics of the flow size and volume of the monitoring system. They found that the sample distribution of flow size and length is processed and then sent to the monitor client part with deterministic interarrival time.

Most research tends to study the sum of sources rather than focusing on the subset of packets generated by a single source. Past research focused on the multiplex internet core metric, which does not consider details for individual flow. For the sum of independent traffic sources, Cerna et al. [7] assumed a normal distribution and used the central limit theorem to estimate maximum throughput of the transport link in a base station. An experiment of tree topological scenarios for a network based on 3, 6, and 16 sources was conducted. Premaratne and Premarathne [8] studied network traffic in backbone links as a sum of independent Bernoulli sources, which resulted in a Poisson binomial distribution with a skewed Gaussian distribution. Only few research was related to the study of the characteristics of traffic log data. Nguyen et al. [9] studied aggregated daily traffic logs dataset obtained between the local subnet part of the Ivanovao State University campus network and the internet service provider. Analysis of the aggregated traffic data showed that

the inter-session time and session size distribution could effectively be described by the q-exponential distribution along with results from their previous research [10].

2.3 Queuing Analysis

Mathematical investigations of data loss in network telecommunication are important and can be accomplished by using queuing analysis. Heavy tail traffic distributions such as Weibull, Pareto and Log-normal are used to model queues with non-stationary arrival rates. One disadvantage of analyzing queuing with heavy-tail traffic distribution is the tendency for considerable mathematical sophistication because many heavy tail distributions do not have a specific formula, as stated by Rakesh et al. [11].

Ming et al. [12] studied the traffic distribution of their input traffic data by using hyper exponential distributions fitting technique combined with a matrix geometric solution approach to analyze the queue performance of Pareto/M/1/K. Sheng et al. [13] analyzed the waiting time distribution using the same technique as Ming et al. [12]. Araik and Mikhali [14] studied the Weibull/M/1 and Weibull/Weibull/1 queues with single server queues. Moreover, comparison was used to assess the efficiency of the mean for the waiting time and the mean of sojourn time for Weibull/M/1 with M/M/1 and Weibull/Weibull/1 with M/M/1.

For packet loss and packet delay, Xiaolong and Geyong [15] proposed an analytical model for a single server queuing system with the self-similarity input traffic and heavy-tail packet size distribution. The developed model of the packet size data is based on two heavy-tail distributions, the Log-normal and Pareto. Strelkovskaya and Solovskaya [16] proposed a mathematical estimation of probabilities and time characteristics of QoS for multiservice video traffic of G/M/1 queuing system with Weibull arrival packet flow distribution.

Several researches have studied the ON/OFF process in queuing. An ON/OFF process is the state which reflects active/inactive behavior of the network. It is adopted in various settings and influences the performance of the queue. Jian and Kevin [17] modeled the ON/OFF source traffic with Pareto and exponential distributions. This method was relevant

since Jian and Kevin (2006), Mohsen H. (2017) [18] also described the realistic burst traffic data by modeling ON/OFF source traffic with the Pareto distribution.

A majority of research tends to study the M/M/1 queue system, which considers the Poisson arrival process and exponential service time such as Kadir [19]. Kayvan et al. [20] also studied the M/M/1 system. For an advanced technique for queuing, Van and Son [21] applied the queuing analysis with the wireless sensor network via the M/M/1 and M/M/1/K in order to evaluate the optimal service rate and buffer size. Moreover, Guo et al. [22] applied queuing with the base station in the mobile edge computing (MEC) service in order to find the optimal amount of communication and resources to guarantee the QoS for all users at a minimal total expenditure. One challenge in this research was determining the right service time distribution and they simplified it by assuming that it followed the exponential distribution. In conclusion, the queuing model for a base station was modeled as M/M/n/∞ and the priority level was also involved. This is similar to the work of Guo et al. [23].

From the related research mentioned previously, there are many types of traffic distribution that can be used to find the best fitted distribution among different network data and model the queuing analyze model. Traffic distribution can be divided into two commonly used types, non heavy tailed traffic distributions and heavy tail traffic distributions. The non heavy tailed traffic distribution, known as the traditional approach, is the most popular because of ease in terms of understanding and mathematical calculation. However, network traffic is sometimes difficult to interpret, so more complicated distributions such as the heavy-tailed traffic distribution needs to be used to analyze the traffic instead.

For the topological analyses of queuing with multiple queues, Le et al. [24] proposed the tandem queue in multihop wireless network which is comparable to the exact method and decomposition method. Two scenarios were performed: for two queue cases and more than two queue cases. Loss probability and average delay are measured. At that moment, the result showed that the decomposition method got precise performance measures with lower computational complexity. Besides wireless networks, Kattepur and Nambiar [25] also applied the queuing network with multi-tiered web applications and developed a Mean Value Analysis (MVA) for performance analysis in order to test for high-availability and varying concurrency. In queuing network models for performance testing, each of the

load generating server, web/application server and database server will monitor the following metrics which are CPU, Disk, and Network. Each server will have individual queues for CPU, Disk and Network. The prediction technique can precisely predict the mean deviations seen for throughput (pages/ second) and Response Time.

Furthermore, in the complex communication system, Yang and Shan [26] simplified the analysis as tandem open queuing network which consisted of multiple Geo/Geo/1 clients and a server with a batch service queue. The study of average delay and overflow probability are validated by the analytical model and simulations. The study reported that the result from the analytical solution and simulations has no significant difference in most cases. This suggests that the analyses of queuing networks can be done through simulations for more straightforward explanations.

Several factors (e.g. the large number of sources or servers) and systematic complexity could lead to complications in the queuing model. Simulation research simplifies the process. Simulations help in deriving the significant decisions for the system decision making and solves the complication problem efficiently. In order to obtain delay, Tickoo and Sikdar [27] applied G/G/1 queue by using Ns-2 simulation, which can be used to simulate different network topologies, the number of nodes, as well as the load on the network. In this work, 10 and 20 source nodes with a packet size of 1000 bytes was used as the setting. Comparison of the simulation result with the analytical result revealed a close match.

For the moderate load cases, the difference between analytical and simulation results is acceptable because simulation helps to reduce computational complexity. PalunčIć et al. [28] mentioned that recent research concerning the queuing analysis of Cognitive Radio Network (CRNS) has been extremely complex in order to characterize the delay, throughput and other performance metrics, thus giving insight about resource allocation, medium access control and QoS provisioning. In addition to the banking system case study, Ehsanifar et al. [29] studied queuing using Arena simulation software, which showed that the interaction between customers and servers in models such as the M/M/C model is similar to Ghaleb et al. [30]. Ghaleb et al. can also be modeled using Arena simulation software to rank and select the best alternative to use in industrial engineering and operations management.

Unlike previous works which mostly characterize aggregated traffic in backbone links and single-queue analysis, this research studies the characteristics of logged data traffic generated by FLPs running different services and investigates the end-to-end packet loss performance in a network of switches under such input traffic. We found that the packet interarrival times are correlated and cannot be captured by traffic models that assume independence. Packet loss performance under a large number of FLPs feeding traffic to a network of switches are evaluated under both time-series traffic models and independence traffic models as benchmarks to identify any performance inconsistency.

Moreover, we also prove that the simulation result and analytical result are not too different in most cases. Our results will help predict the sustainable number of FLPs running different services and traffic intensity of log data generated by FLPs for future system expansion or scaling.

CHAPTER 3 METHODOLOGY

We aim to determine which traffic models can represent network traffic data generated from FLPs well and use the models to evaluate the packet loss performance. We first describe the OpenStack testbed environment, data acquisition from FLPs installed in the testbed, data preprocessing, and their statistical properties. The steps to analyze and fit the data to traffic models are then presented. At the end of the chapter, the evaluation metrics for comparing various results are presented.

3.1 FLP Log Data Acquisition

Using the OpenStack-based CERN Cloud infrastructure and Linux CentOS 7 images, all instances of FLPs were created with 4 VCPUs, 7.3 GB of memory, and 40 GB of disk space. Each FLP is installed with the FLP Suite, containing many sets of tools that will be used for detector readout and quality control. Figure 3.1 shows the logging system architecture. Two types of services are installed on every FLP, Filebeat, and Packetbeat. The Filebeat monitors the log files and collects log events from the agent while Packetbeat monitors the outbound network traffic of log data from FLPs Logstash server. After filtering the data, the remaining data will be sent to Elasticsearch server and Kibana server for further analysis. From the logging system architecture, the loss normally occurs between the FLPs and the Logstash due to the flooding log traffic data from the FLPs.

We assume a single Logstash server in the system which is the worst-case scenario for multi-servers as all traffic is concentrated to a single bottleneck switch in the network. The collected dataset consists of the single workflow scenario where each FLP runs one workflow only. The workflow is a set of applications or a service which will be used for readout functionality and quality control for the detector. This research analyzes the network log, which was collected from a Packetbeat on the FLP. Each log transaction contains the timestamp, total bytes transferred, and agent name.

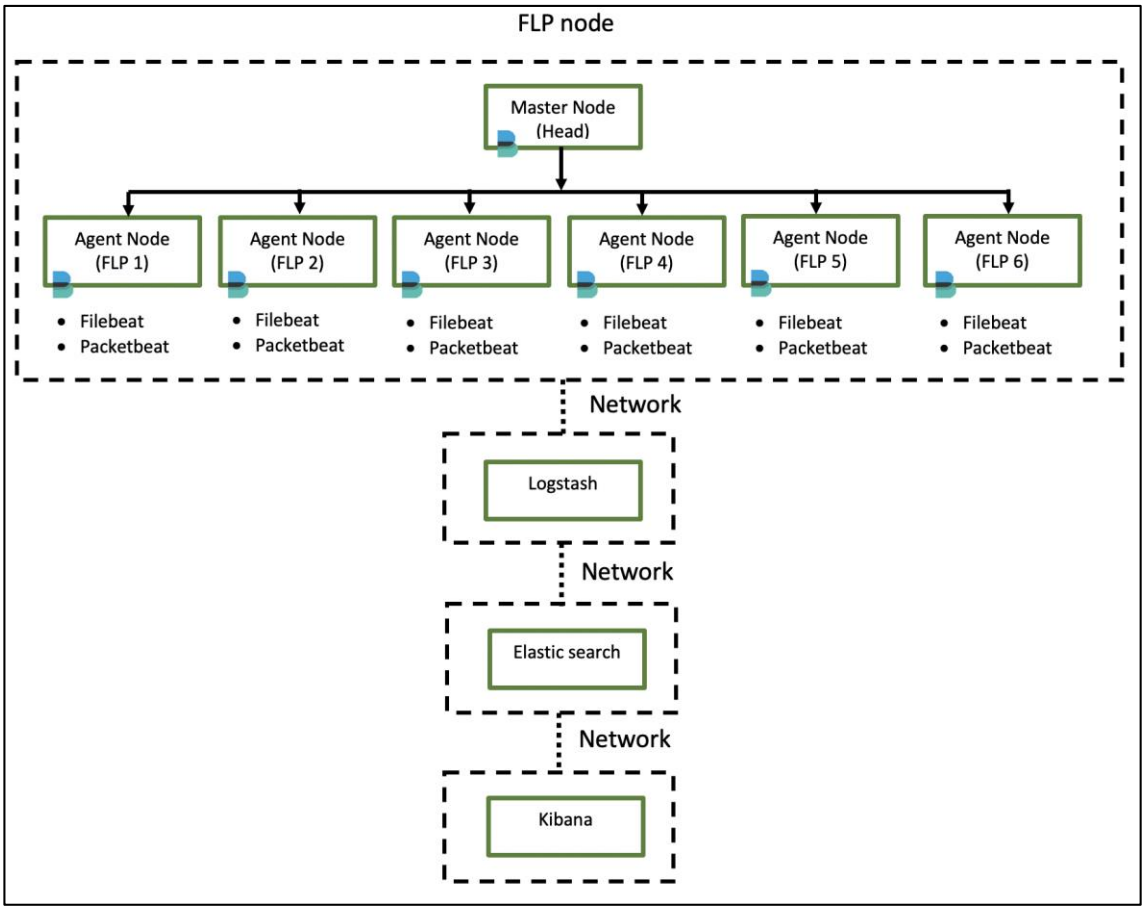


Figure 3.1 Logging system architecture in the openStack testbed environment

3.2 Framework Design

The first step to estimate the packet loss through simulation is to find traffic models which can well represent the network traffic data generated from FLPs for the system. The time-series model and the distribution model are the two key models that we believe could represent trace data. The simulation based on the modeled topology will be tested after fitting trace data with those models in order to find the model representation. Finally, the end-to-end loss, queue utilization, and 95% confidence interval of end-to-end loss will be used to assess how well the model compares to the trace data. The representation of network traffic data will be completed at the end

Figure 3.2 A diagram of overall framework process

Different workflows might run on FLPs, depending on the required operational activities. Each FLP is expected to run only a single workflow at a time. The more complex the workflow, the more logs will be generated. Because of the resource limitation in the testbed environment, only a few number of FLPs can be created and emulated for traffic generation. Four workflows will be considered in this study: readout-stfb-qc, readout-stfb, readout-qc, and readout. These workflows are mainly used for reading out and monitoring the quality of the data.

3.3 Data Preprocessing

The data preprocessing section starts with data cleaning by converting the types of collected data to the appropriate form and unit such as converting both date and time into YYYY/MM/DD HH:MM:SS format. Then, the same timestamp data will be aggregated and measured for the interarrival time of each transaction. Some outliers and deterministic

values in the dataset like the keep alive packet and ping packet will then be deleted. Table 3.1 shows a rundown of data preprocessing.

Table 3.1 Data preprocessing summary

Task (Records)	**Workflow**			
	readout-stfb-qc	**readout-stfb**	**readout-qc**	**readout**
1. Original data	1512	919	949	3477
2. Group under the same timestamp.	1404	835	899	3193
3. Remove Interarrival time which more than 30,000 and some deterministic value in order to find the real traffic distribution.	934	625	568	3193
4. Cleansed data	934	625	568	2532

Finally, the data will be concatenated into cleansed data. The summary statistics of packet interarrival times collected from the four workflows are shown in Table 3.2.

Table 3.2 Interarrival time statistic summary

Stat Summary	**Workflow**			
	readout-stfb-qc	**readout-stfb**	**readout-qc**	**readout**
Duration (minute)	22.05	88.86	67.51	132.82
Counts	260	625	200	600
Mean (millisecond)	4869.76	5724.39	5254.70	7413.99
Standard deviation (millisecond)	5110.14	5726.56	5175.69	6344.55
Min (millisecond)	7	15	35	7
25% (millisecond)	1262.75	1033.0	1480.0	1364.75
50% (millisecond)	2958.50	3634.0	3187.50	6063.50
75% (millisecond)	6968.50	9077.0	9035.25	12212.75
Max (millisecond)	21522.00	27134.0	26887.0	28239.0

Figures 3.3-3.18 show the interarrival time distribution and packet size distribution of all workflows. According to the interarrival time distribution, the majority of the interarrival times of all workflows appears to fall between 0 and 5 seconds. According to the network byte distribution, the bulk of all workflow packet sizes tend to be about 30 bytes and 300 bytes.

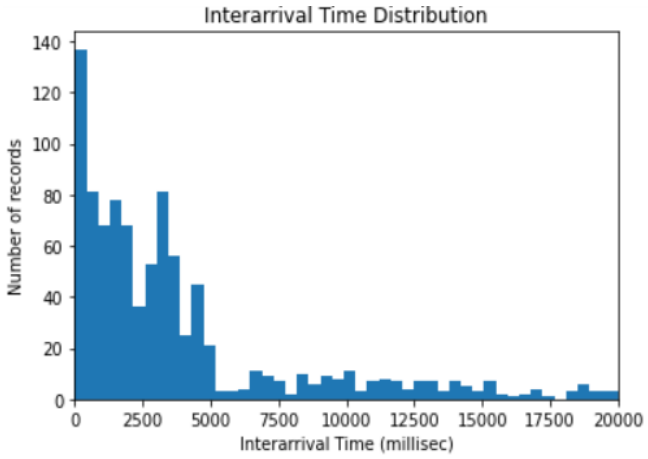


Figure 3.3 The interarrival time distribution of readout-stfb-qc workflow

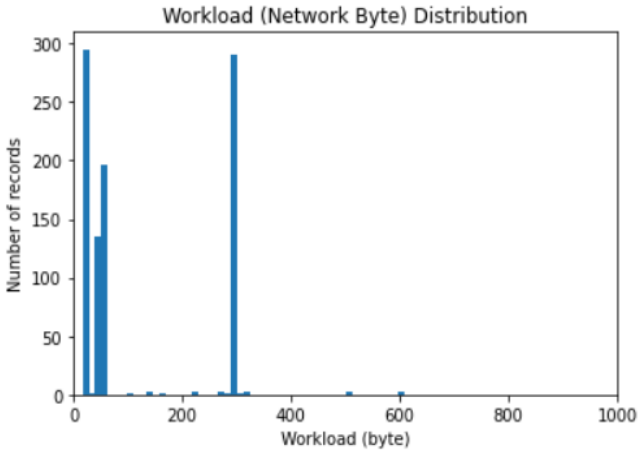


Figure 3.4 The packet size distribution of readout-stfb-qc workflow

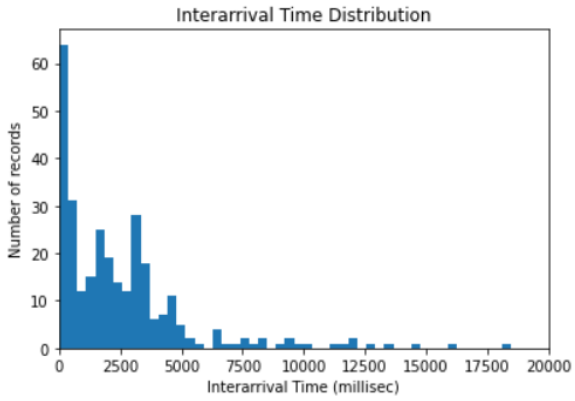


Figure 3.5 The interarrival time distribution and packet size distribution of readout-stfb workflow

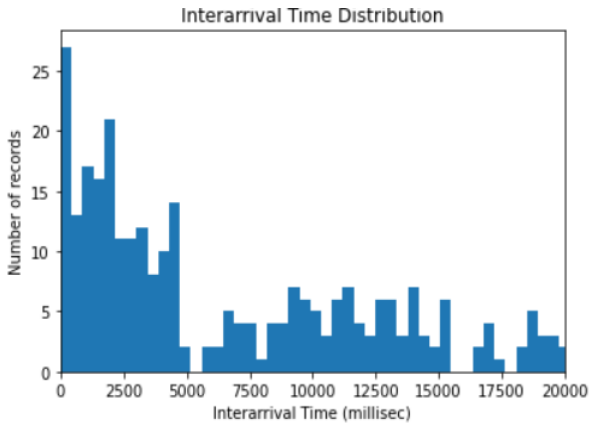


Figure 3.6 The interarrival time distribution of packet size about 300 bytes of readout-stfb-qc workflow

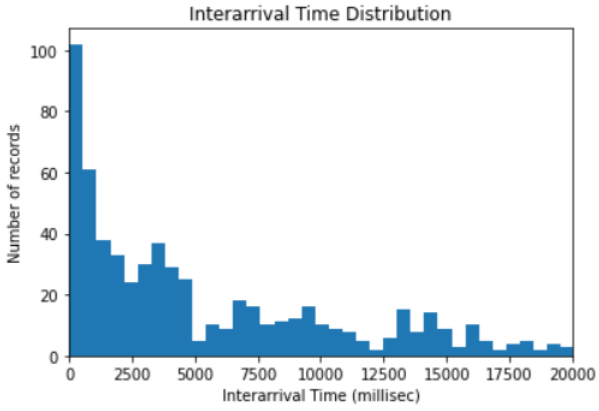


Figure 3.7 The interarrival time distribution of readout-stfb workflow

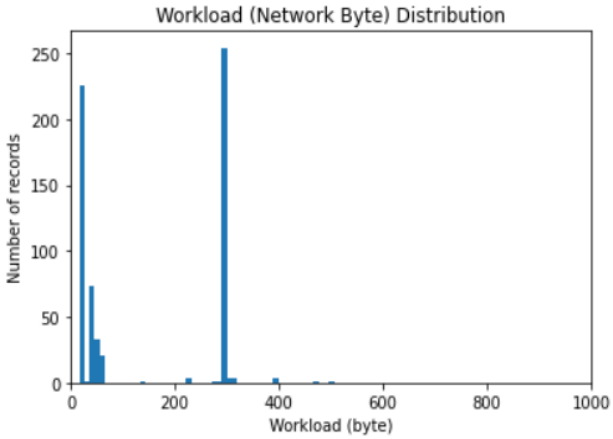


Figure 3.8 The packet size distribution of readout-stfb workflow

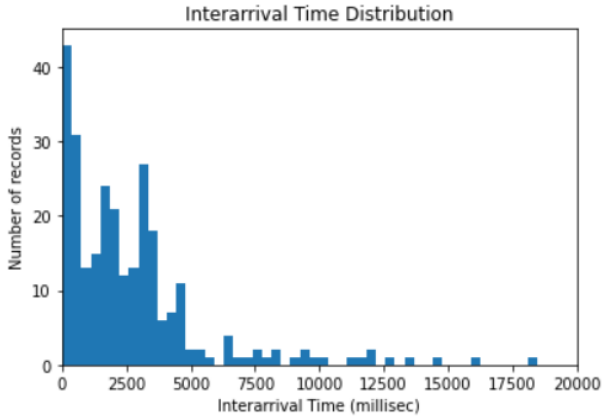


Figure 3.9 The interarrival time distribution of packet size about 30 bytes of readout-stfb workflow

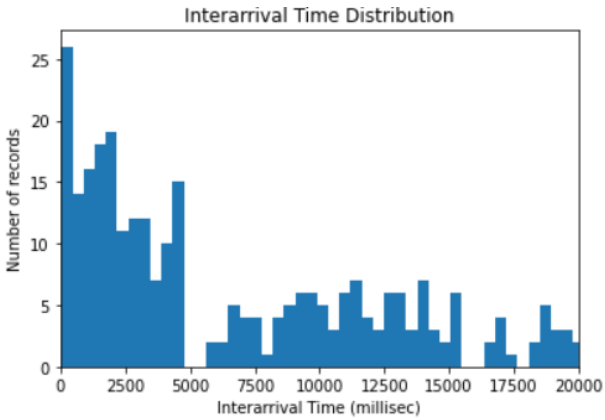


Figure 3.10 The interarrival time distribution of packet size about 300 bytes of readout-stfb workflow

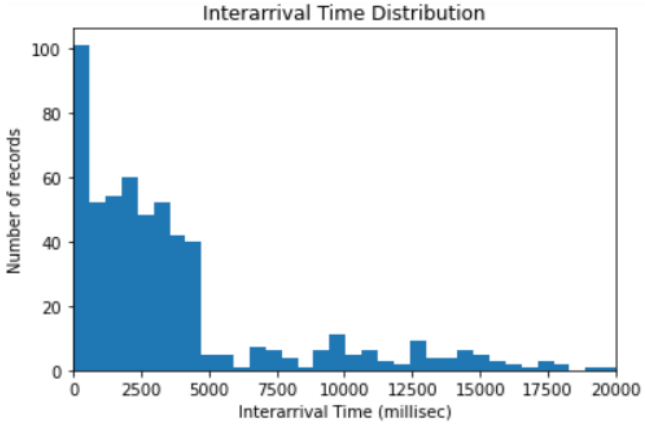


Figure 3.11 The interarrival time distribution of readout-qc workflow

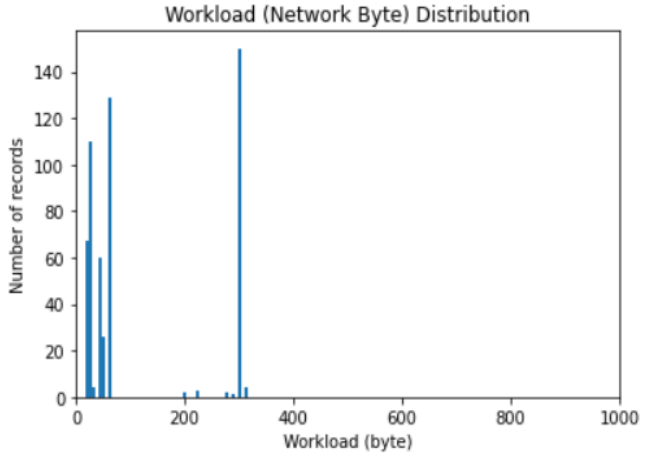


Figure 3.12 The packet size distribution of readout-qc workflow

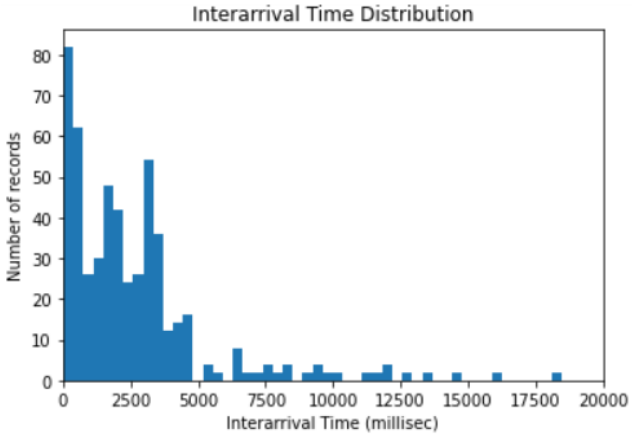


Figure 3.13 The interarrival time distribution of packet size about 30 bytes of readout-qc workflow

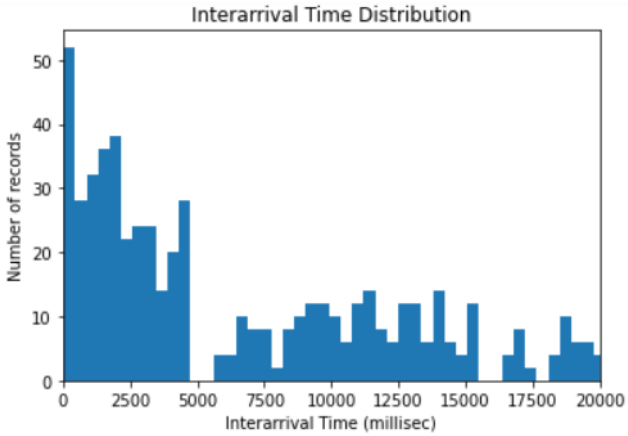


Figure 3.14 The interarrival time distribution of packet size about 300 bytes of readout-qc workflow

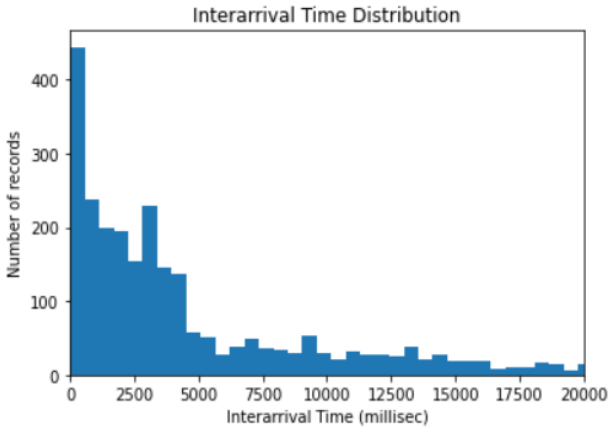


Figure 3.15 The interarrival time distribution of readout workflow

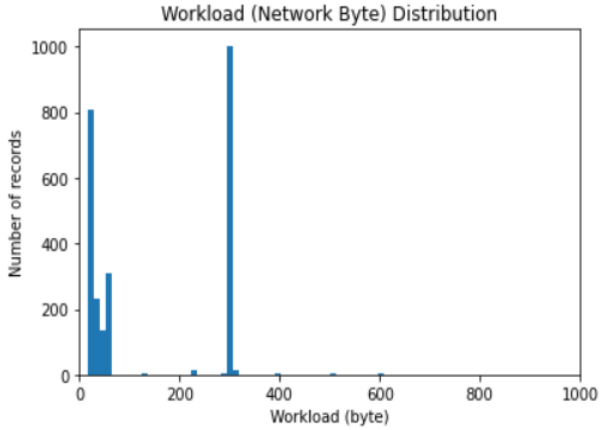


Figure 3.16 The packet size distribution of readout workflow

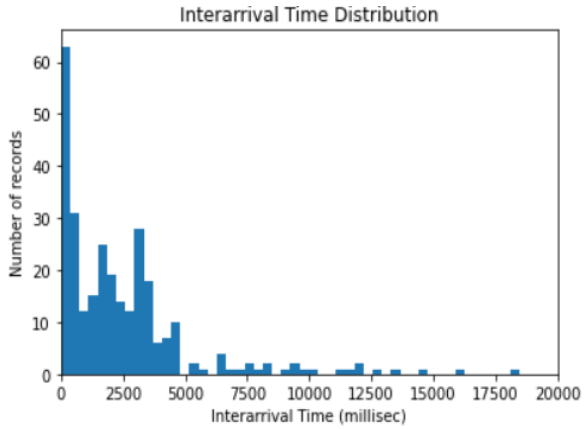


Figure 3.17 The interarrival time distribution of packet size equal 30 bytes of readout workflow

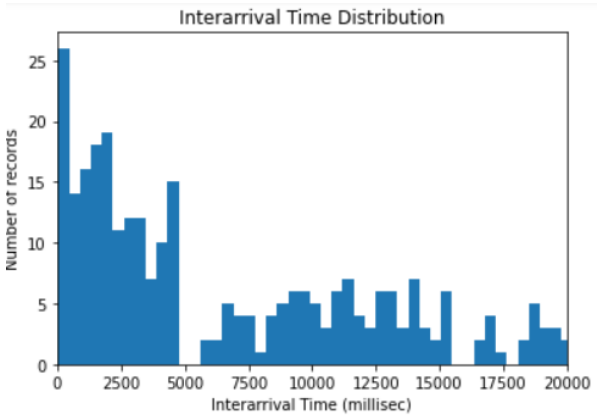


Figure 3.18 The interarrival time distribution of packet size equal 300 bytes of readout workflow

3.4 Data Analysis

The study of aggregated interarrival time is considered in the data analysis discussion in order to find the recommended bandwidth, which is determined from the maximum aggregated bytes range separated by the time interval. Then, in order to check that the interarrival period has a connection with itself, autocorrelation in the interarrival distribution will be examined. Finally, the time-series model was used to find the fitting outcomes of each workflow.

3.4.1 Study of Aggregated Interarrival Time

Since the aggregated interval time based on 5 milliseconds is the finest unit, it will be selected as the suitable bandwidth for production. As shown in Table 3.3, the aggregated byte and the recommended bandwidth was selected based on modal values. The recommended bandwidth was calculated from maximum aggregated bytes range divided by the time interval. The recommended bandwidth for readout-stfb, readout-qc, and readout workflows is approximately 500 Kbps at the finest unit.

Table 3.3 The recommended bandwidth

Task	Aggregated timestamp	Bin range	Recommended Bandwidth (bit per sec)
readout-stfb-qc	5 ms	16.00 - 27.84	25,600.00 – 44,544.00
	100 ms	288.32 - 300.16	23,065.60 – 24,012.80
	500 ms	284.60 - 300.40	4,553.60 – 4,806.40
	1 s	284.60 - 300.40	2,276.80 – 2,403.20
readout-stfb	5 ms	290.40 - 300.20	464,640.00 – 480,320.00
	100 ms	294.30 - 306.40	23,544.00 – 24,512.00
	500 ms	287.20 - 305.28	4,595.20 – 4,884.48
	1 s	287.20 - 305.28	2,297.60 – 2,442.24
readout-qc	5 ms	298.00 - 304.00	476,800.00 – 486,400.00
	100 ms	298.08 - 304.96	23,846.40 – 24,396.80
	500 ms	298.08 - 304.96	4,769.28 – 4,879.36
	1 s	98.08 - 304.96	2,384.64 – 2,439.68
readout	5 ms	294.30 - 306.40	470,880.00 – 490,240.00
	100 ms	294.30 - 306.40	23,544.00 – 2,4512.00
	500 ms	286.98 - 302.92	4,591.68 – 4,846.72
	1 s	287.20 - 305.28	2,297.60 – 2,442.24

3.4.2 ACF and PACF plots

The interarrival times of each task are examined for their correlation by plotting the autocorrelation function (ACF) and partial autocorrelation function (PACF). The ACF and PACF plots can be used to analyzed and specify values for the seasonal model by

examining correlations at seasonal lag time steps. The chart of the autocorrelation plot and partial autocorrelation plot will be studied in order to determine the randomness of interarrival time. If the interarrival time is not random, the lag value needs to be determined. For the readout-stfb-qc, readout-stfb, and readout-qc, only parts of data are selected in the analysis.

3.4.3 Time-Series Model Fitting

To begin, the Dickey-Fuller Test must be performed to confirm the patterns and seasonal effects. Since substantial lags in the plots indicate that there is a connection in the interarrival periods, a time-series model such as autoregressive moving average (ARMA) is more suitable than simply fitting with a proper probability distribution, even though a fit would be a more convenient choice in terms of simulations. If large lags in the plots indicate a seasonal connection in the interarrival periods, a time-series model like the seasonal autoregressive integrated moving average (SARIMA) will be chosen.

1. Dickey-Fuller Test

The Dickey-Fuller test is a common statistical test used to determine whether a given time-series is stationary or not. Being stationary is a significant factor in time-series which refers to the data having no trend. Normal statistical analysis is incorporates hypothesis testing that involves a null and alternate hypothesis, so a test statistic is computed. The criteria of the Dickey-Fuller test are focused on p-values.

2. ARMA Model

The ARMA model is a popular time-series model which can be characterized by two terms which are the order of the AR term (p), the order of the MA term (q) as shown in Eq.(3.1) where Y_t is the data at time t, ε_t is an error at time t, β_t is a coefficient of data at time t, ϕ_t is a coefficient of error at time t and α is a constant.

$$Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + .. + \beta_p Y_{t-p} + \phi_1 \varepsilon_{t-1} + \phi_2 \varepsilon_{t-2} + .. + \phi_q \varepsilon_{t-q} \quad (3.1)$$

3. SARIMA Model

SARIMA is a well-known extension of ARIMA that supports the seasonal component. There are four seasonal elements that are not part of ARIMA that need to be considered

which are the seasonal autoregressive order (p), the seasonal difference order (d), the seasonal moving average order(q), and the number of time steps for a single seasonal period (s).

3.5 Experimental Scenarios

After traffic has been fitted to appropriate traffic source models, the models would be used to generate 1024-byte packets to evaluate the end-to-end packet loss in a two-layer network of switches with a large number of FLPs feeding traffic to the network in the topology. The variables considered for performance modeling are link capacities in the network, interarrival time distribution, buffer size, and packet size.

The simulation model represents an interconnection of Ethernet switches connected in a tree topology, where each switch has 48 1 GB ports and the output port buffer size is set to 0.5 MB based on a commercial medium-size switch. The lowest layer of switches connects FLPs and traffic is aggregated to the top switch connecting to the Logstash server, which is the bottleneck switch in the network. Three simulation scenarios were created, all of which are similar except for the number of first-layer network switches and the number of each FLP. The number of FLPs chosen is determined by the network switch input and future system expansion.

OMNET++, a discrete-event simulation tool, is used for the simulation. Each task simulation scenario is repeated for five runs. The average of packet losses with their 95% confidence intervals and the bottleneck link utilization are computed. In our experiments, the interarrival times will be scaled to saturate the link utilization of the top switch to investigate how the packet loss will increase as FLPs generate traffic at higher rates. OMNET++ can generate numbers based on various built-in probability distribution modules but not a time series process like ARMA.

Furthermore, the log is also fitted to exponential and Pareto distributions. These distributions represent smooth and highly bursty traffic, respectively, to benchmark the loss performance. In order to obtain a result and compare it to the selected model, the trace data will be tested in each scenario.

3.5.1 First Scenario: Logstash with 192 FLPs

In the first scenario, each switch's first-layer network is connected with 48 FLPs, implying that the switches of the first-layer network would be fully connected with 192 FLPs. Then, as shown in Figure 3.19, the second-layer switch network is connected to the Logstash server. The first scenario parameter for simulation is listed in Table 3.4.

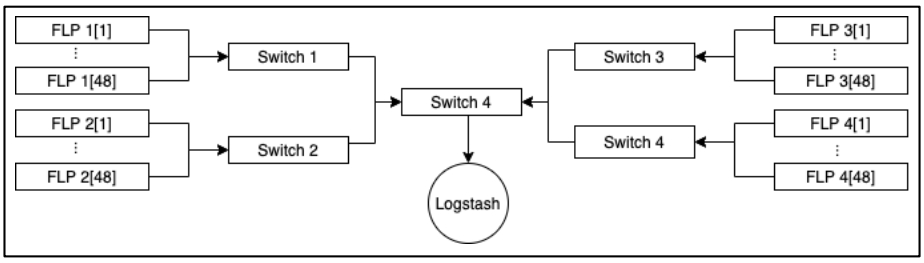


Figure 3.19 The first scenario network topology

Table 3.4 Simulation parameter of the first scenario

Parameter	Value
Number of FLPs	192
Default mean interarrival time of readout-stfb-qc. (ARMA, Pareto and Exponential)	3.7 seconds
Default mean interarrival time of readout-stfb. (ARMA, Pareto and Exponential)	4.6 seconds.
Default mean interarrival time of readout-qc. (ARMA, Pareto and Exponential)	4 seconds.
Default mean interarrival time of readout. (ARMA, Pareto and Exponential)	6.1 seconds.
Packet Size (Byte)	1024
Switch Packet Buffer Size (MB) Base on HPE 1620-48G switch	0.5
Bandwidth (Mbps)	1

3.5.2 Second Scenario: Logstash with 384 FLPs

Each first-layer network of switch is connected with 48 FLPs, similarly to the first scenario, which means that the first-layer network of switches would be fully connected with 384 FLPs. Then, as shown in Figure 3.20, the second-layer switch network is connected to the Logstash server. The second scenario parameter for simulation is listed in Table 3.5

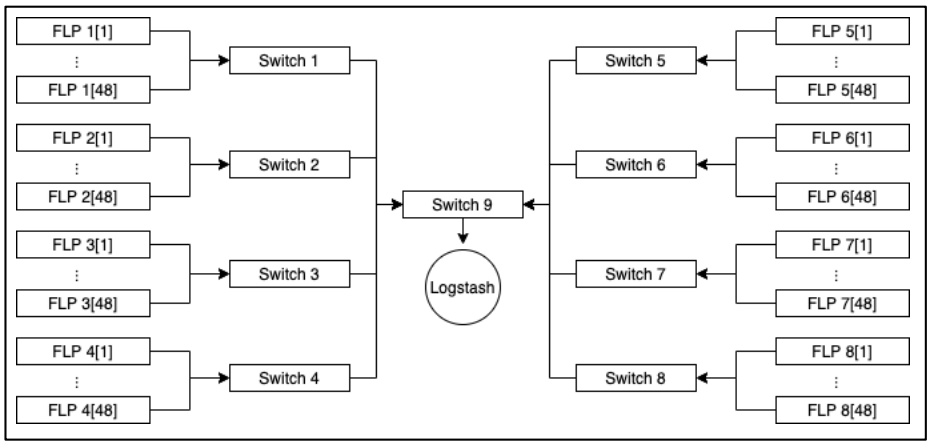


Figure 3.20 The second scenario network topology

Table 3.5 Simulation parameter of the second scenario

Parameter	Value
Number of FLPs	384
Default mean interarrival time of readout-stfb-qc. (ARMA, Pareto and Exponential)	3.7 seconds
Default mean interarrival time of readout-stfb. (ARMA, Pareto and Exponential)	4.6 seconds.
Default mean interarrival time of readout-qc. (ARMA, Pareto and Exponential)	4 seconds.
Default mean interarrival time of readout. (ARMA, Pareto and Exponential)	6.1 seconds.
Packet Size (Byte)	1024
Switch Packet Buffer Size (MB) Base on HPE 1620-48G switch	0.5
Bandwidth (Mbps)	1

3.5.3 Third Scenario: Logstash with 2,304 FLPs

To estimate the system's upper bound, the FLPs node and first-layer network switch are increased in this case. The number of first-layer network switches has been increased to 48 in order to investigate the upper bound sustainability of the network. The first-layer network of each switch is also connected with 2,304 FLPs. Then, as shown in Figure 3.21, the second-layer switch network is connected to the Logstash server. Table 3.6 lists the second scenario parameter for simulation.

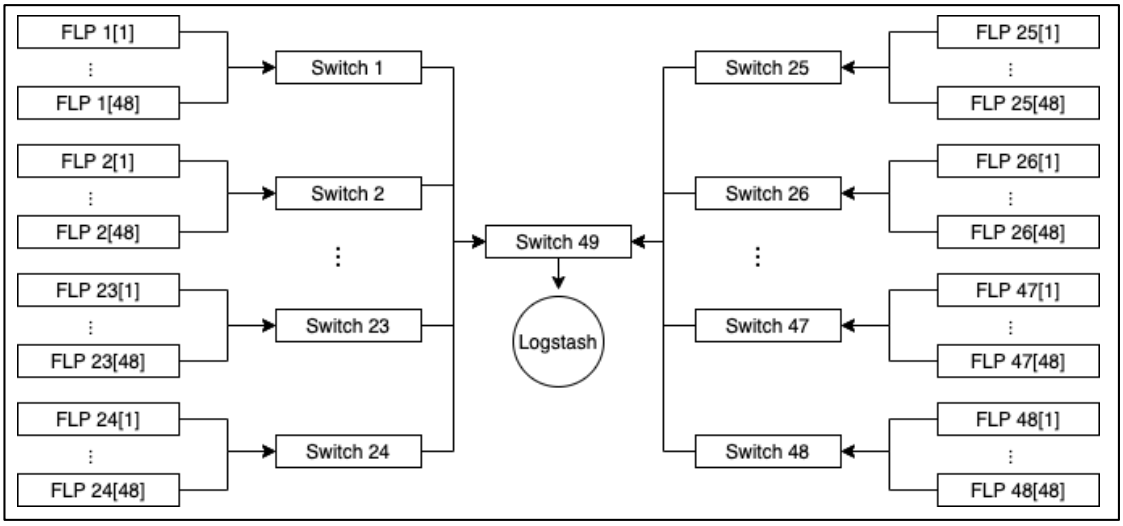


Figure 3.21 The third scenario network topology

Table 3.6 Simulation parameter of the third topology

Parameter	Value
Number of FLPs	2,304
Default mean interarrival time of readout-stfb-qc. (ARMA, Pareto and Exponential)	4.0 seconds
Default mean interarrival time of readout-stfb. (ARMA, Pareto and Exponential)	4.6 seconds.
Default mean interarrival time of readout-qc. (ARMA, Pareto and Exponential)	4.4 seconds.
Default mean interarrival time of readout. (ARMA, Pareto and Exponential)	6.4 seconds.

Table 3.6 Simulation parameter of the third topology (cont.)

Parameter	Value
Packet Size (Byte)	1024
Switch Packet Buffer Size (MB) Base on HPE 1620-48G switch	0.5
Bandwidth (Mbps)	1

3.6 Evaluation

In this research, the following evaluators will be used to assess the time-series model and the stochastic distribution model.

1. End-to-end Loss is the metric that would be used to measure the loss of a packet that is transmitted across a network from source to destination. The less the end-to-end loss, the better the choice. The calculation for end-to-end loss is shown in Eq. (3.2).

$$\text{End-to-end loss} = \frac{\text{Number of packet dropped}}{\text{Source generated packet-All packets currently in queues}} \quad (3.2)$$

2. Queue Utilization is the metric that would be used to measure the congestion of the queue. High utilization means the network is overloaded, while low utilization means the queue is not busy. The formula is shown in Eq. (3.3).

$$\text{Queue Utilization} = \frac{\text{Packet size* 8* Number of FLPs}}{\text{Mean Interarrival time*Link Bandwidth}} \quad (3.3)$$

3. 95% Confidence Interval of end-to-end loss Loss is a metric that is used to measure the true mean value of end-to-end loss. The formula is shown in Eq. (3.4).

$$\text{95\% Confidence Interval of End -to-end loss} = \text{Mean End-to-end loss} \pm \frac{\text{Z*Standard Deviaiton of End-to-end loss}}{\sqrt{\text{Number of simulation running}}} \quad (3.4)$$

CHAPTER 4 EVALUATION RESULTS

In this chapter, we first describe the correlation structure in interarrival times, Dickey-Fuller test of interarrival times and time-series model fitting. At the end of the chapter, the distribution result and trace data result are shown. To find the best represented model compared to the real trace result, the model verification must be considered and performed linear regression on the number of FLPs and end-to-end loss to guide the number of FLPs that the network can support for various types of tasks operating on FLPs.

4.1 Correlation Structure in Interarrival Times

The autocorrelation function and partial autocorrelation function plots of the tasks invalidates the independence assumptions of interarrival times for log data generated from the tasks. The significant values of the first few lags in the autocorrelation function plots indicate that the interarrival times are dependent and modeling them by just fitting a distribution could lead to inaccurate packet loss in the simulation.

The time series graph of the readout stfb-qc workflow in Figure 4.1 shows that the lag appears to have a seasonal pattern, as shown in the autocorrelation plot. There is no pattern in the other workflows.

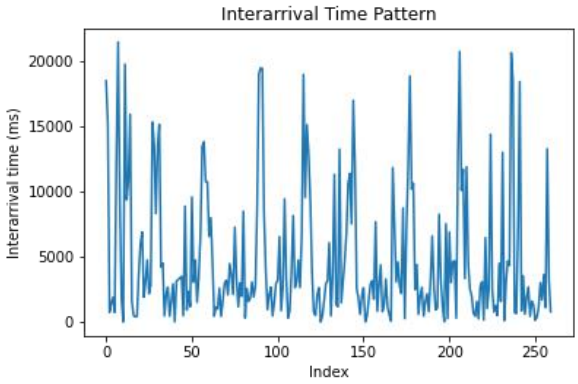


Figure 4.1 Time series plot of readout-stfb-qc workflow

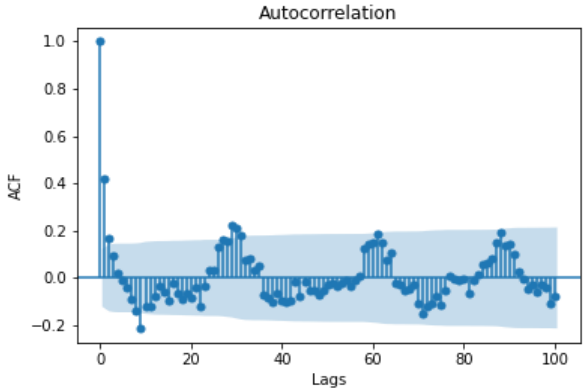


Figure 4.2 ACF plot of readout-stfb-qc workflow

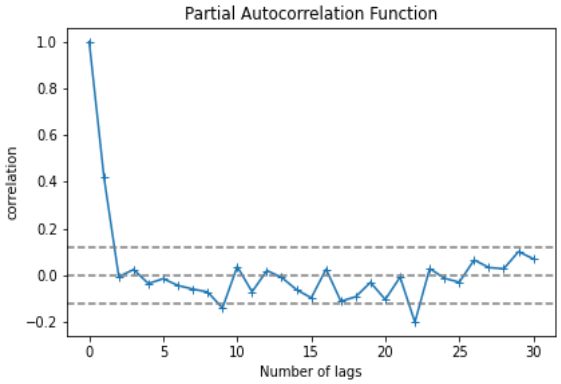


Figure 4.3 PACF plot of readout-stfb-qc workflow

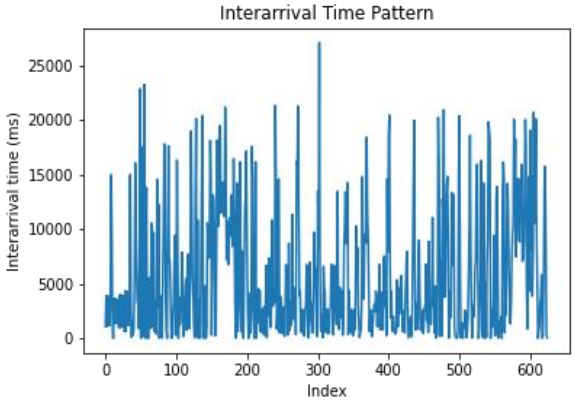


Figure 4.4 Time series plot of readout-stfb workflows

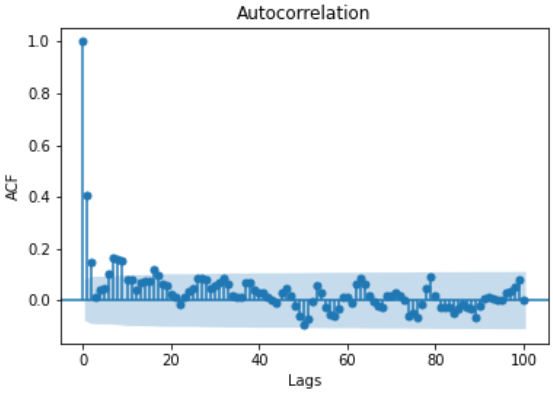


Figure 4.5 ACF plot of readout-stfb workflows

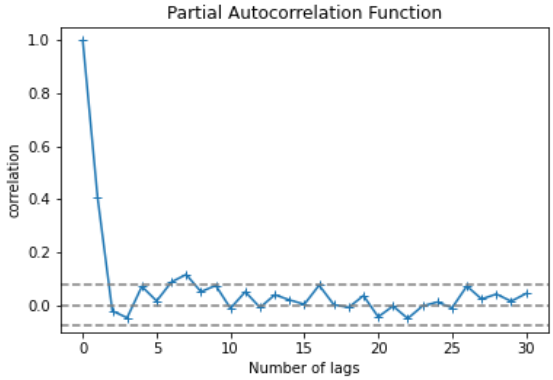


Figure 4.6 PACF plot of readout-stfb workflow

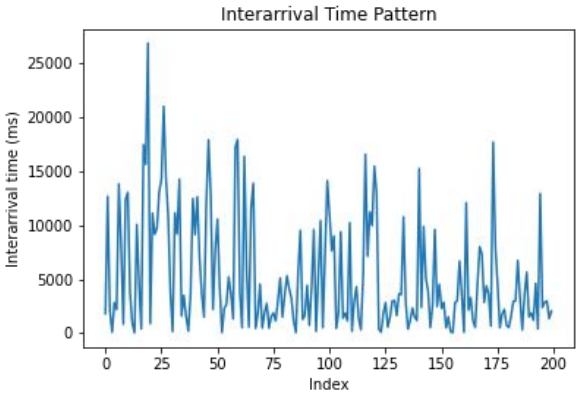


Figure 4.7 Time series plot of readout-qc workflows

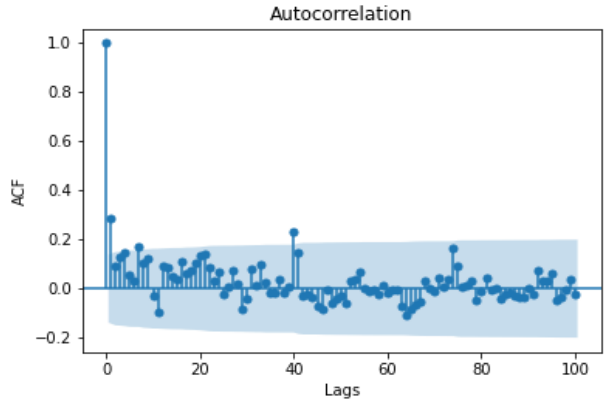


Figure 4.8 ACF plot of readout-qc workflows

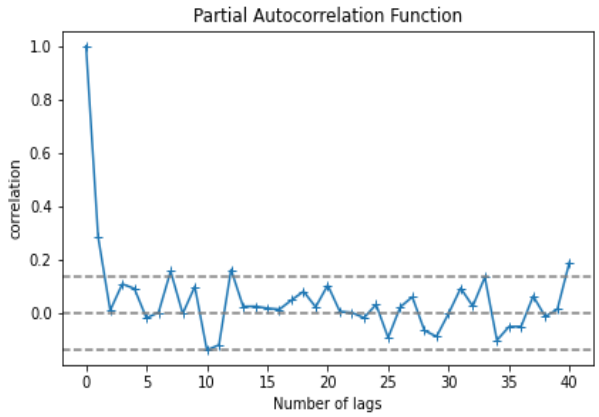


Figure 4.9 PACF plot of readout-qc workflows

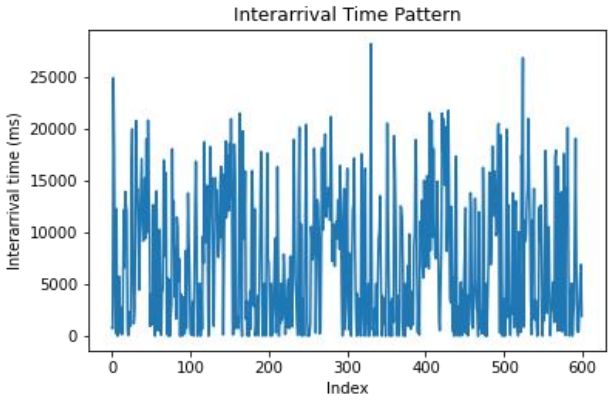


Figure 4.10 Time series plot of readout workflows

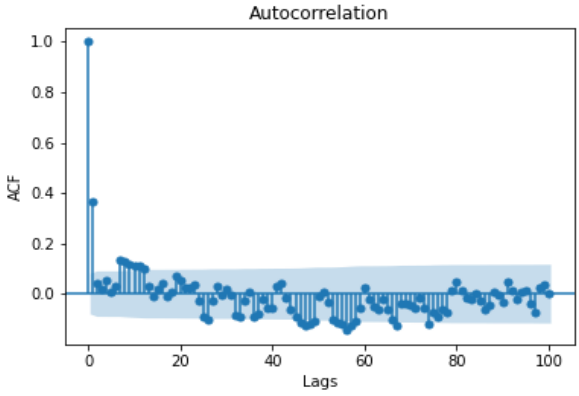


Figure 4.11 ACF plot of readout workflows

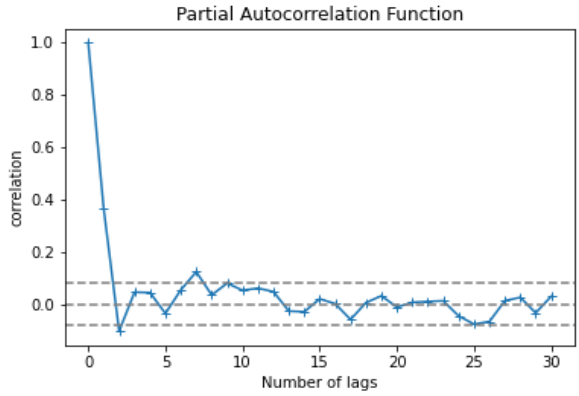


Figure 4.12 PACF plot of readout workflows

4.2 Dickey-Fuller Test of Interarrival Times

To assess whether each workflow is stationary, the Dickey-Fuller test needs to be evaluated. In accordance to the Dickey-Fuller test, the null hypothesis would be defined as the presence of a unit root. The p-values from the test shown in Table 4.1 are all less than 0.05, implying that all task data except readout-stfb-qc task are stationary. As a result, both a stationary and non-stationary time-series model will be examined. In the readout-stfb-qc workflow, the stationary time-series will be taken into account. Other workflows will take into account the non-stationary time-series model.

Table 4.1 Dickey fuller test

Workflow	Dickey Fuller Test	
	ADF statistic	***P-value***
readout-stfb-qc	-1.125664	0.236449
readout-stfb	-5.630379	0.000001
readout-qc	-4.793392	0.034988
readout	-4.952048	0.000028

4.3 Time-Series Model Fitting

In order to identify the best combination of parameters, the AIC (Akaike Information Criterion) values are used for the model selection. The range of p and q orders are fitted using statsmodels library in Python and the appropriate model parameters are selected from those with relatively small AICs and orders such that all the fitted coefficients are significant. Table 4.2 shows the fitted model orders corresponding to minimum and maximum AICs and that of the selected model orders.

Comparing all the AIC values along with significant coefficients, selection based on the criteria resulted in the lower AIC values with less order parameters. Thus, it can be concluded that the suitable order is SARIMA (2, 0, 3) (3,0,1,30) for readout-stfb-qc workflow, ARMA (0,0,2) for readout-stfb workflow, ARMA (3,0,2) for readout-qc workflow, and ARMA (2,0,0) for readout workflow.

Table 4.2 The summary of fitting parameter

Workflow	Aggregated Information		
	Order: Min AIC	**Order: Max AIC**	**Selected Order: Selected AIC**
readout-stfb-qc	(5, 0, 5)(4, 0, 5, 30): 2,059.78	(1, 0,5)(1,0,0,30): 4,496.10	(2, 0, 3)(3,0,1,30): 3307.71
readout-stfb	(7,0,0):12,340.52	(0,0,0):12,572.97	(0,0,2):12,424.67
readout-qc	(3,0,5):3,859.85	(0,0,0):3,971.88	(3,0,2):3,917.83
readout	(7,0,0):11,969.76	(0,0,0):12,191.73	(2,0,0):12,083.80

4.4 Distribution Results

The packet losses for different mean interarrival times, the number of FLPs, and traffic source models fitted from the data was considered. Time-series models, such as ARMA, and probabilistic distributions, such as Pareto and exponential distributions, were chosen. Each workflow simulation scenario was repeated for five runs to calculate average packet losses and bottleneck link utilization. The mean interarrival times are reduced to increase the top switch queue utilization while preserving the main statistical properties of the traffic data, allowing for the observation of packet losses.

4.4.1 First Scenario: Logstash with 192 FLPs

Tables 4.3 to 4.6 demonstrate that the system can easily handle 192 FLPs with nearly no packet loss. The loss was less than 1% from beginning to end. When the traffic intensity per FLP increases by about three times and the link utilization at the bottleneck reaches over 95 percent, end-to-end packet loss appears. The end-to-end packet loss for exponential and Pareto distribution traffic models is slightly higher than for time-series models.

Table 4.3 Packet loss with readout-stfb-qc task input generated from 192 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
3693.3	ARMA	0	0.0004	(0,0)
	Pareto	0	0.0004	(0,0)
	Exponential	0	0.0004	(0,0)
1.8	ARMA	0.02	0.7903	(0.00,0.04)
	Pareto	0.01	0.7929	(-0.02,0.05)
	Exponential	0.01	0.7924	(0.00,0.03)
1.6	ARMA	0.55	0.8878	(0.52,0.57)
	Pareto	1.59	0.8916	(1.56,1.62)
	Exponential	0.45	0.8905	(0.40,0.49)
1.5	ARMA	2.61	0.9823	(2.55,2.66)
	Pareto	5.75	0.9997	(5.67,5.84)
	Exponential	3.77	0.9885	(3.62,3.91)

Table 4.4 Packet loss with readout-stfb task input generated from 192 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4560.1	ARMA	0	0.0003	(0,0)
	Pareto	0	0.0003	(0,0)
	Exponential	0	0.0003	(0,0)
2.3	ARMA	0	0.6383	(0,0)
	Pareto	0	0.6528	(0,0)
	Exponential	0.08	0.6366	(0.06,0.11)
1.8	ARMA	0.12	0.7981	(0.10,0.14)
	Pareto	0.19	0.8162	(0.13,0.24)
	Exponential	0.91	0.7970	(0.81,1.00)
1.5	ARMA	4.11	0.9652	(4.05,4.17)
	Pareto	6.55	0.9765	(6.45,6.65)
	Exponential	5.18	0.9592	(4.98,5.38)

Table 4.5 Packet loss with readout-qc task input generated from 192 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
3930.4	ARMA	0	0.0004	(0,0)
	Pareto	0	0.0004	(0,0)
	Exponential	0	0.0004	(0,0)
2.0	ARMA	0.10	0.7517	(0.08,0.13)
	Pareto	0	0.7414	(0,0)
	Exponential	0	0.7432	(0,0)
1.7	ARMA	0.73	0.8458	(0.70,0.76)
	Pareto	0	0.8341	(0,0)
	Exponential	0.02	0.8361	(0.00,0.05)
1.5	ARMA	3.05	0.9783	(2.93,3.17)
	Pareto	2.15	0.9645	(2.06,2.24)
	Exponential	3.16	0.9665	(2.98,3.35)

Table 4.6 Packet loss with readout task input generated from 192 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
6119.2	ARMA	0	0.0002	(0,0)
	Pareto	0	0.0002	(0,0)
	Exponential	0	0.0002	(0,0)
2.4	ARMA	0.12	0.5910	(0.08,0.15)
	Pareto	0	0.6055	(0,0)
	Exponential	0.13	0.5987	(0.08,0.18)
1.9	ARMA	1.18	0.7700	(1.06,1.30)
	Pareto	1.09	0.7865	(1.05,1.14)
	Exponential	2.26	0.7722	(2.15,2.37)
1.5	ARMA	6.17	0.9608	(6.03,6.30)
	Pareto	9.39	0.9905	(9.28,9.50)
	Exponential	7.96	0.9640	(7.86,8.05)

4.4.2 Second Scenario: Logstash with 384 FLPs

Tables 4.7 to 4.10 also show that the system can easily handle 384 FLPs without losing any packets. The loss was also less than 1% from beginning to end. When the link utilization at the bottleneck exceeds 95%, the end-to-end packet loss begins to rise. End-to-end packet loss was also higher with exponential and Pareto distribution traffic models than with time-series models.

Table 4.7 Packet loss with readout-stfb-qc task input generated from 384 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
3725.8	ARMA	0	0.0008	(0,0)
	Pareto	0	0.0008	(0,0)
	Exponential	0	0.0008	(0,0)
7.4	ARMA	0	0.3898	(0,0)
	Pareto	0	0.3946	(0,0)
	Exponential	0.20	0.3952	(0.18,0.22)

Table 4.7 Packet loss with readout-stfb-qc task input generated from 384 FLPs (cont.)

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
3.7	ARMA	0.41	0.7787	(0.37,0.46)
	Pareto	0.26	0.7893	(0.18,0.34)
	Exponential	0.75	0.7910	(0.71,0.79)
3.0	ARMA	3.65	0.9672	(3.57,3.72)
	Pareto	7.67	0.9925	(7.51,7.84)
	Exponential	6.79	0.9811	(6.66,6.92)

Table 4.8 Packet loss with readout-stfb task input generated from 384 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4556.6	ARMA	0	0.0006	(0,0)
	Pareto	0	0.0006	(0,0)
	Exponential	0	0.0006	(0,0)
4.6	ARMA	0.35	0.6421	(0.29,0.41)
	Pareto	0.02	0.6427	(0.00,0.03)
	Exponential	1.04	0.6446	(0.96,1.13)
3.6	ARMA	1.91	0.8013	(1.83,2.00)
	Pareto	1.27	0.8043	(1.19,1.35)
	Exponential	3.89	0.8132	(3.69,4.08)
3.0	ARMA	7.08	0.9659	(6.90,7.25)
	Pareto	8.87	0.9535	(8.72,9.02)
	Exponential	10.01	0.9735	(9.81,10.21)

Table 4.9 Packet loss with readout-qc task input generated from 384 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4016.3	ARMA	0	0.0007	(0,0)
	Pareto	0	0.0007	(0,0)
	Exponential	0	0.0007	(0,0)
8.0	ARMA	0	0.3661	(0.00,0.01)
	Pareto	0	0.3630	(0,0)
	Exponential	0	0.3651	(0,0)
4.0	ARMA	0.68	0.7325	(0.61,0.76)
	Pareto	0	0.7260	(0,0)
	Exponential	0.19	0.7304	(0.16,0.23)
3.0	ARMA	5.32	0.9773	(5.24,5.41)
	Pareto	4.35	0.9684	(4.28,4.43)
	Exponential	5.15	0.9694	(5.03,5.28)

Table 4.10 Packet loss with readout task input generated from 384 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
6150.4	ARMA	0	0.0005	(0,0)
	Pareto	0	0.0005	(0,0)
	Exponential	0	0.0005	(0,0)
6.1	ARMA	0.41	0.4756	(0.34,0.49)
	Pareto	0	0.4683	(0,0)
	Exponential	0.30	0.4851	(0.27,0.33)
4.1	ARMA	1.99	0.7097	(1.90,2.08)
	Pareto	1.32	0.7020	(1.25,1.39)
	Exponential	4.18	0.7316	(4.11,4.24)
3.0	ARMA	9.13	0.9423	(8.96,9.30)
	Pareto	12.26	0.9675	(12.20,12.33)
	Exponential	11.38	0.9850	(11.27,11.49)

4.4.3 Third Scenario: Logstash with 2,304 FLPs

Tables 4.11 to 4.14 also show packet loss, indicating that the system is able to sustain 2,304 FLPs. Before scaling down, the default mean interarrival time suffered an end-to-end loss of about 1%, which is acceptable. After scaling down, the scaled mean interarrival time suffered an end-to-end loss more than 5%. When the link utilization at the bottleneck exceeds 50%, end-to-end packet loss begins to appear. Furthermore, with exponential and Pareto distribution traffic models, the end-to-end packet loss was higher than with time-series models. As a result, it can be concluded that a 0.5 MB packet buffer is insufficient for a thousand FLPs when the interarrival time is scaled down.

Table 4.11 Packet loss with readout-stfb-qc task input generated from 2,304 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
3965.4	ARMA	0.79	0.0044	(0.75,0.83)
	Pareto	0.81	0.0044	(0.68,0.95)
	Exponential	0.79	0.0045	(0.72,0.85)
32.9	ARMA	9.37	0.5204	(4.52,14.22)
	Pareto	10.31	0.5366	(9.51,11.12)
	Exponential	10.59	0.5467	(9.71,11.46)
23.9	ARMA	13.14	0.7211	(8.80,17.48)
	Pareto	16.05	0.7347	(14.66,17.44)
	Exponential	16.02	0.7484	(15.38,16.66)
17.8	ARMA	21.56	0.9750	(15.91,27.21)
	Pareto	21.59	0.9883	(19.81,23.37)
	Exponential	20.93	0.9954	(20.07,21.79)

Table 4.12 Packet loss with readout-stfb task input generated from 2,304 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4686.9	ARMA	1.21	0.0037	(1.18,1.24)
	Pareto	1.20	0.0037	(1.18,1.23)
	Exponential	1.20	0.0037	(1.19,1.22)
25.7	ARMA	18.76	0.6645	(16.49,21.03)
	Pareto	19.76	0.6812	(18.39,21.13)
	Exponential	19.01	0.7032	(18.73,19.29)
22.5	ARMA	21.63	0.7937	(18.89,24.37)
	Pareto	22.55	0.7958	(21.16,23.94)
	Exponential	22.11	0.8026	(21.77,22.45)
18.8	ARMA	25.39	0.9575	(23.41,27.37)
	Pareto	27.19	0.9385	(25.76,28.62)
	Exponential	27.41	0.9438	(27.07,27.75)

Table 4.13 Packet loss with readout-qc task input generated from 2,304 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4504.7	ARMA	0.75	0.0039	(0.71,0.78)
	Pareto	0.75	0.0040	(0.70,0.80)
	Exponential	0.75	0.0039	(0.70,0.80)
28.3	ARMA	8.03	0.6049	(6.77,9.29)
	Pareto	7.73	0.6351	(7.50,7.96)
	Exponential	8.79	0.6289	(6.27,11.31)
25.3	ARMA	10.01	0.7171	(7.93,12.08)
	Pareto	10.41	0.7511	(9.59,11.23)
	Exponential	12.16	0.7429	(8.35,15.96)
18.3	ARMA	20.39	0.9807	(16.28,24.50)
	Pareto	19.96	0.9897	(18,42,21.49)
	Exponential	19.37	0.9961	(13.55,25.20)

Table 4.14 Packet loss with readout task input generated from 2,304 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
6598.2	ARMA	1.38	0.0026	(1.31,1.45)
	Pareto	1.37	0.0027	(1.30,1.44)
	Exponential	1.37	0.0027	(1.29,1.45)
25.9	ARMA	21.16	0.6576	(20.53,21.79)
	Pareto	23.43	0.6899	(23.24,23.61)
	Exponential	23.73	0.6852	(23.16,24.30)
22.1	ARMA	23.9	0.7774	(23.37,24.43)
	Pareto	28.03	0.7986	(27.82,28.24)
	Exponential	26.6	0.8088	(25.63,27.58)
18.6	ARMA	27.46	0.9184	(27.21,27.71)
	Pareto	33.04	0.9570	(32.76,33.31)
	Exponential	30.52	0.9529	(29.79,31.25)

4.5 Trace Data Results

Trace data must also be tested in each scenario in order to compare which distribution can best represent the real trace data. The criteria for trace data simulations are identical to those for distribution simulations. Packet loss will be considered for various mean interarrival times, the number of FLPs, and traffic source models fitted from the data. Five runs are repeated and the average of packet losses was calculated.

4.5.1 First Scenario: Logstash with 192 FLPs

Tables 4.15 to 4.18 demonstrate that the system can easily handle 192 FLPs with no packet loss. The default mean interarrival time shows that the end-to-end loss was zero before scaling down. When the traffic intensity per FLP increases to the point where the link utilization at the bottleneck exceeds 95%, end-to-end packet loss appears.

Table 4.15 Packet loss with readout-stfb-qc task input generated from 192 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
3736.8	Default	0	0.0004	(0,0)
1.9	Default	0.01	0.7840	(-0.01,0.04)
1.7	Default	0.48	0.8822	(0.39,0.57)
1.5	Default	2.77	0.9818	(2.55,3.00)

Table 4.16 Packet loss with readout-stfb task input generated from 192 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4572.7	Default	0	0.0003	(0,0)
2.3	Default	0	0.6407	(0,0)
1.8	Default	0.10	0.8169	(0.08,0.13)
1.5	Default	3.21	0.9719	(3.12,3.29)

Table 4.17 Packet loss with readout-qc task input generated from 192 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4055.3	Default	0	0.0004	(0,0)
2.0	Default	0	0.7224	(0,0)
1.8	Default	1.77	0.8334	(1.65,1.89)
1.5	Default	7.71	0.9823	(7.60,7.82)

Table 4.18 Packet loss with readout task input generated from 192 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
6088.6	Default	0	0.0002	(0,0)
2.4	Default	0	0.6015	(0,0)
1.8	Default	0	0.7940	(0,0)
1.5	Default	2.74	0.9872	(2.66,2.82)

4.5.2 Second Scenario: Logstash with 384 FLPs

Tables 4.19 to 4.22 also show that the system can easily handle 384 FLPs without losing any packets. The end-to-end loss is also less than 0%, according to the default mean interarrival time. Furthermore, when the link utilization at the bottleneck exceeds 95%, end-to-end packet loss begins to rise.

Table 4.19 Packet loss with readout-stfb-qc task input generated from 384 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
3756.5	Default	0	0.0008	(0,0)
7.5	Default	0	0.3900	(0,0)
3.8	Default	0.79	0.7793	(0.65,0.92)
3.0	Default	7.27	0.9720	(6.83,7.70)

Table 4.20 Packet loss with readout-stfb task input generated from 384 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4489.2	Default	0	0.0007	(0,0)
4.5	Default	0.03	0.6527	(0.02,0.04)
3.6	Default	0.43	0.8167	(0.40,0.45)
3.0	Default	3.71	0.9842	(3.54,3.88)

Table 4.21 Packet loss with readout-qc task input generated from 384 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4119.1	Default	0	0.0007	(0,0)
8.2	Default	0	0.3556	(0,0)
3.9	Default	0.80	0.7481	(0.64,0.96)
3.0	Default	10.13	0.9851	(10.04,10.21)

Table 4.22 Packet loss with readout task input generated from 384 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
6103.4	Default	0	0.0005	(0,0)
6.1	Default	0.06	0.4800	(0.05,0.07)
4.1	Default	0.20	0.7200	(0.19,0.21)
3.0	Default	4.13	0.9759	(4.05,4,21)

4.5.3 Third Scenario: Logstash with 2,304 FLPs

The system can also support 2,304 FLPs, as shown in Tables 4.23 to 4.26. The end-to-end loss is less than 1%, which is acceptable, according to the default mean interarrival time. Due to the larger number of FLPs, when the link utilization at the bottleneck reaches over 60%, end-to-end packet loss begins to appear when the mean interarrival time is scaled down. As a result, even with more scaling, the packet buffer size is insufficient to support a thousand FLPs.

Table 4.23 Packet loss with readout-stfb-qc task input generated from 2,304 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
6103.4	Default	0	0.0005	(0,0)
6.1	Default	0.06	0.4800	(0.05,0.07)
4.1	Default	0.20	0.7200	(0.19,0.21)
3.0	Default	4.13	0.9759	(4.05,4,21)

Table 4.24 Packet loss with readout-stfb task input generated from 2,304 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4593.8	Default	0.73	0.0038	(0.71,0.74)
27.2	Default	17.45	0.6455	(17.24,17.66)
21.8	Default	20.7	0.8064	(20.55,20.84)
18.4	Default	23.4	0.9528	(23.21,23.59)

Table 4.25 Packet loss with readout-qc task input generated from 2,304 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
4358.5	Default	0.67	0.0040	(0.66,0.69)
26.2	Default	11.79	0.6699	(11.50,12.07)
20.7	Default	17.48	0.8510	(17.33,17.63)
17.7	Default	23.01	0.9953	(22.82,23.20)

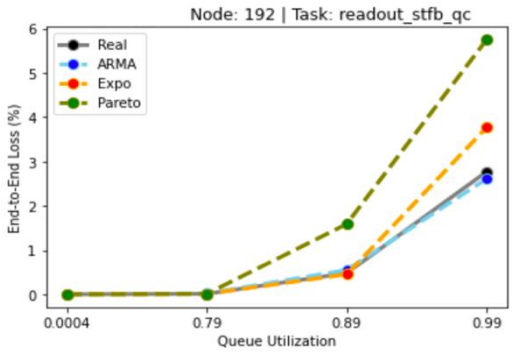
Table 4.26 Packet loss with readout task input generated from 2,304 FLPs

Mean Interarrival Time (ms)	Traffic model	End-to-end loss (%)	Queue Utilization	95% CI of End-to-end loss
6394.6	Default	0.90	0.0027	(0.89,0.91)
24.3	Default	20.43	0.7221	(20.38,20.49)
20	Default	23.60	0.8798	(23.49,23.72)
17.6	Default	25.59	0.9968	(25.45,25.73)

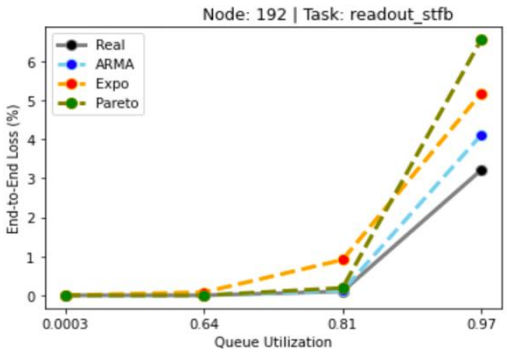
4.6 Model Verification

In order to find the model that could best represent the real trace result, model verification must take into account end-to-end packet loss and queue utilization of each task. The horizontal axis on the graph represents queue utilization, while the vertical axis depicts end-to-end loss. The solid line depicts real trace data end-to-end loss, while the dashed line depicts distribution end-to-end loss. Each point is based on interarrival time scaling.

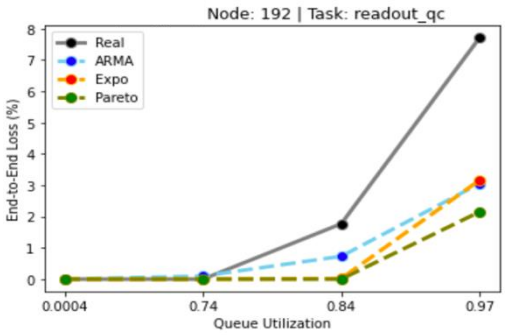
When comparing the results of 192 and 384 FLPs in each task, the end-to-end packet loss increases dramatically when the queue utilization reaches 80% in both trace data and distribution. Figures 4.13 and 4.14 show that the more the interarrival time unit is scaled, the more queue utlizaiton occurs, resulting in more loss.



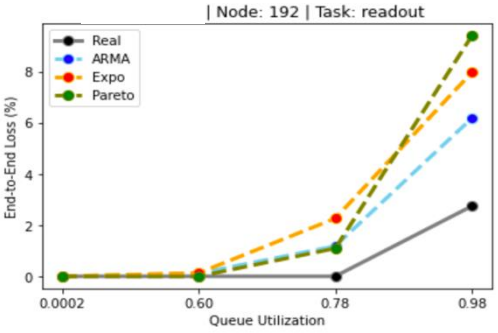
(a) readout-stfb-qc workflow



(b) readout-stfb workflow

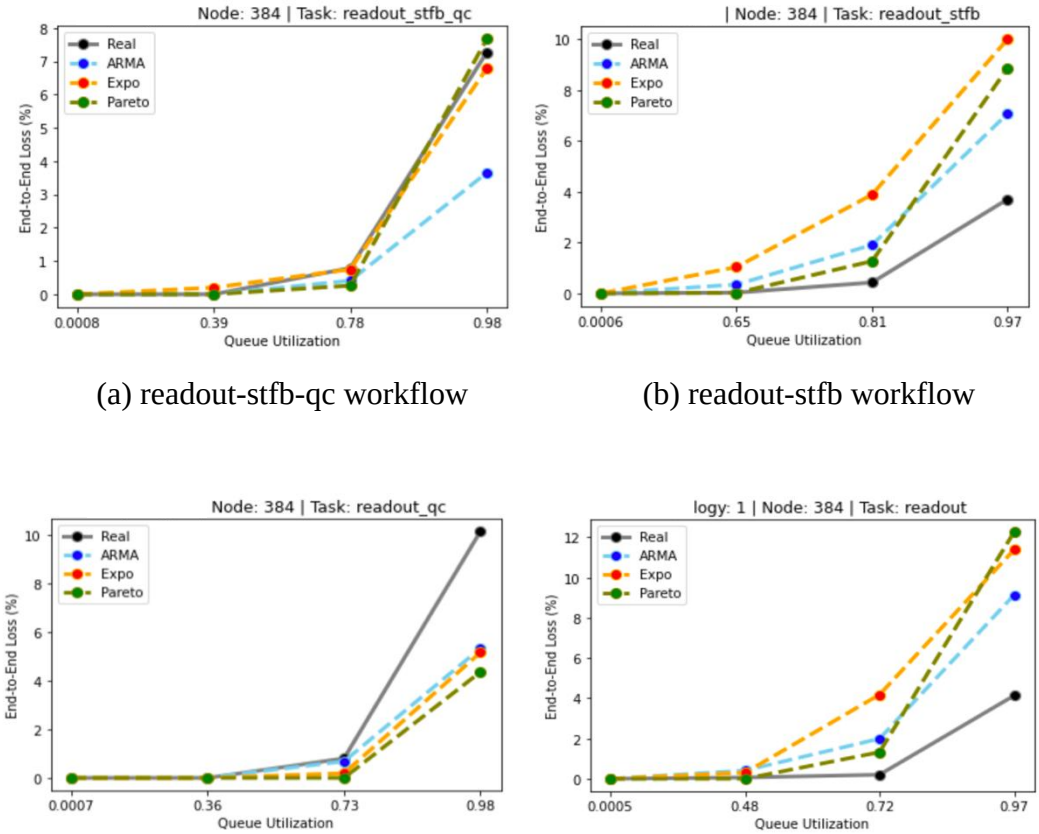


(c) readout-qc workflow.



(d) readout workflow

Figure 4.13 Packet loss and queue utilization plot of 192 FLPs

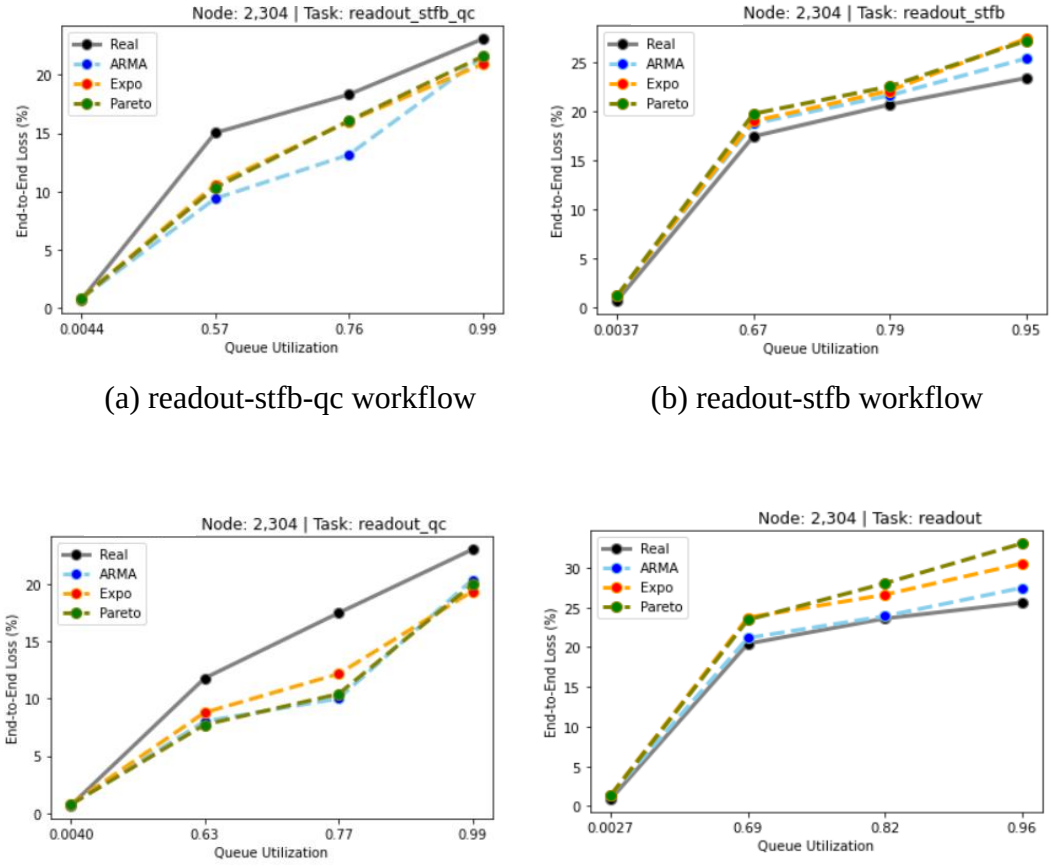


(a) readout-stfb-qc workflow (b) readout-stfb workflow

(c) readout-qc workflow (d) readout workflow

Figure 4.14 Packet loss and queue utilization plot of 384 FLPs

Due to the large number of FLPs in third scenario, Figure 4.15 shows that end-to-end packet loss occurs at the default level and begins to level up when queue utilization reaches 60% in both trace data and distribution. Large FLPs and a smaller switch packet buffer size result in significant losses of approximately 20% in both distribution and trace data. The end-to-end loss rose because of sending packets with insufficient space. Increasing the size of the switch packet buffer will help to minimize the increased loss



(a) readout-stfb-qc workflow (b) readout-stfb workflow

(c) readout-qc workflow (d) readout workflow

Figure 4.15 Packet loss and queue utilization plot of 2,304 FLPs

The distribution and trace data are compared. When comparing all workflows with the trace data in the first scenario, which included 192 FLPs, the time-series model or ARMA produced the least amount of error. Readout-stfb-qc workflow, readout-stfb workflow, and readout workflow were the most commonly overestimated. The readout-qc workflow was often underestimated.

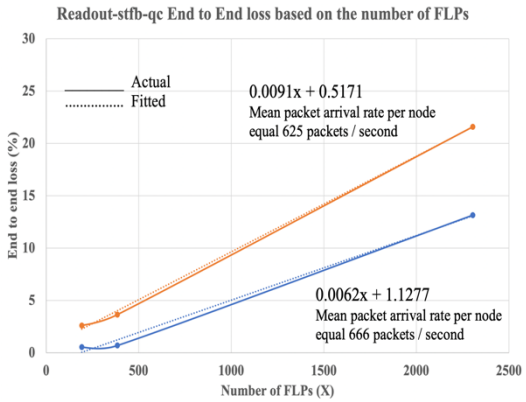
ARMA also had the highest similarity value in most of the workflows when compared to the trace data 384 FLPs in the second scenario. Similarly to the first scenario, readout-stfb-qc workflow, readout-stfb workflow, and readout workflow are all overestimated in the second scenario. Finally, the readout-stfb-qc task and readout-qc task in the third scenario had the highest similarity values with the exponential distribution, with 2,304 FLPs. In both the readout-stfb and readout tasks, ARMA had the highest similarity values.

From all scenarios, the overestimated values are more accurate than the underestimated values. An exact conclusion cannot be drawn from some scenarios. Except for the readout-qc workflow, the time series model and ARMA gave the closest loss performance to that of the trace data. As a result, the time series model and ARMA appears to be the best representative for all workflows. In addition, the increased number of FLPs and the limited size of the buffer in the configuration may affect the level up and fluctuate in end-to-end loss. As seen from the results, increasing the FLPs to beyond the steady state with the limit switch buffer size caused a significant end-to-end loss.

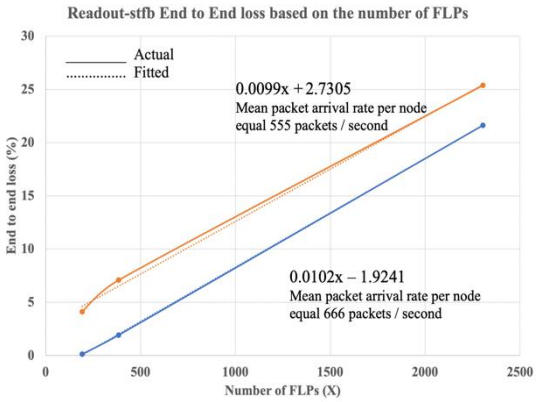
4.7 Modeling the Relationship between the Loss and Number of FLPs

In order to model end-to-end loss from the simulation experiment design, we perform linear regression on the number of FLPs and end-to-end loss to guide the number of FLPs that the network can support for various types of tasks operating on FLPs.

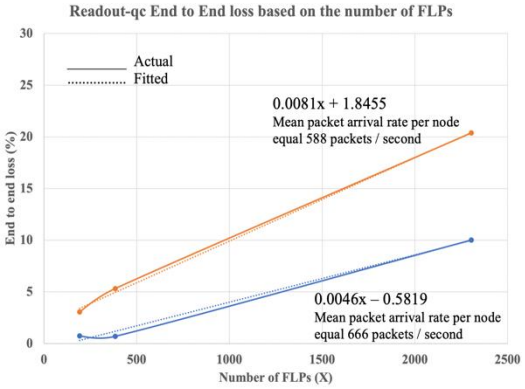
The fitted models for all the workflows are shown in Figure 4.16. In all the cases, the loss increases linearly with the number of FLPs. Figure 4.16 shows how, if ALICE decides to expand the number of FLPs to 1000 nodes with 625 packets per second in the future, they will be aware that the readout-stfb-qc and readout-qc workflow will suffer a loss of around 10%. While the readout-stfb workflow and readout workflow in Figure 4.16(b) and Figure 4.16(d) will lose about 15%.



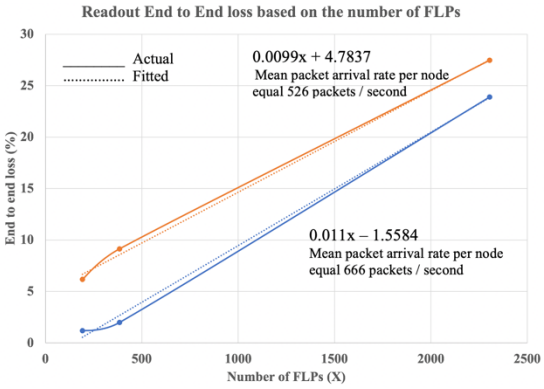
(a) readout-stfb-qc workflow



(b) readout-stfb workflow



(c) readout-qc workflow



(d) readout workflow

Figure 4.16 Fitted regression model for the number of FLPs and the end-to-end loss for different type of workflow

CHAPTER 5 CONCLUSION

During the latest maintenance break, the ALICE experiment at the CERN LHC received a big update (2018-2022). To handle the extremely large detector data input, a new Online-Offline (O^2) computing system has been created. It consists of over 500 nodes that are responsible for data collection, aggregation, and processing. CERN and King Mongkut's University of Technology Thonburi (KMUTT) have collaborated to develop a future AI-based logging system that monitors and identifies abnormal events using log data created from FLPs in ALICE O^2 facilities. The FLPs will be the primary target of the logging scheme.

Our goal is to look at packet loss efficiency under various conditions, such as the number of FLPs and the characteristics of generated log traffic and see if the network can sustain minimal or no data loss. Since access to CERN's production facilities is restricted, a few FLPs were mounted in an OpenStack testbed area, and traffic produced by FLPs is collected using the Packetbeat. After that, the traffic data is fitted to a variety of traffic-source models, which would be used to produce inputs for the simulation models. Our findings will help in determining a sustainable number of FLPs to operate various services for system growth, as well as how much traffic to expect.

We hope to find out which traffic models will accurately reflect network traffic data generated by FLPs and use them to assess packet loss efficiency in this study. The OpenStack testbed environment, data acquisition from FLPs installed in the testbed, data preprocessing, and statistical properties are all described first. Then, using time-series and probabilistic models such as Pareto and exponential distribution, we evaluated and matched the data to the chosen traffic models. Some data analysis also took into account factors such as the study of aggregated interarrival time in order to determine the recommended bandwidth and the interarrival times of each task are analyzed for correlation using autocorrelation function (ACF) and partial autocorrelation function (PACF) plots. To check for variations and seasonal results, the Dickey-Fuller Test was used. The collected data was then fitted into the chosen model.

The simulation tool used in the experiment is OMNET++, which is a discrete-event simulation tool. The average of packet losses with their 95 percent confidence intervals, as well as the bottleneck connection utilizations, was computed for each task simulation scenario after five runs. The chosen distribution and trace data was checked in the three scenarios defined by the experiment: 192 FLPs, 384 FLPs, and 2,304 FLPs.

The results show that the default mean interarrival time experienced an acceptable end-to-end loss of about 1% before scaling down. As the connection utilization at the bottleneck approaches over 50%, end-to-end packet loss appears as the mean interarrival time is scaled down due to the greater number of FLPs. The time series model, also known as ARMA, is the most similar to trace data in most situations. As a result, ARMA tends to be the most accurate representation of all workflows. We conclude by deriving the summary equation of all workflows.

REFERENCE

1. ALICE Collaboration 2015, **Technical Design Report for the Upgrade of the Online-Offline Computing System** [Online], Available: https://cds.cern.ch/record/ 2011297 [2019, December 15].

2. Vino, G., Elia, D., Barroso, V. and Wegrzynek, A., 2017, "A Monitoring System for The New ALICE O^2 Farm", **International Conference on Accelerator and Large Experimental Control Systems (16th)**, 10 October 2017, Spain, pp. 195-200.

3. ALICE Collaboration, 2015, **Upgrade of the Online - Offline Computing System Technical Design Report** [Online], Available: https://cds.cern.ch/record/ 20112 97 [2019, December 15].

4. Chandrasekaran, B., 2009, **Survey of Network Traffic Models** [Online], Available: http://www.cse.wustl.edu/~jain/cse567-06/traffic_models3.html [2020, March 23].

5. Soelistijanto, B. and Howarth, M., 2012, "Traffic Distribution and Network Capacity Analysis in Social Opportunistic Networks", **2012 IEEE 8th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob)**, 8 October 2012, Spain, pp. 823-830.

6. Baris, K., Engin, Z., Utku, Y., Ilysa, A.K., Gunes, K.K and Ali, T.C., 2016, "A Network Monitoring System for High Speed Network Traffic", **2016 13th Annual IEEE International Conference on Sensing, Communication, and Networking (SECON),** 27-30 June 2016, London, UK, pp.1-3.

7. Cerna, R., Garcia, M. and Patino, J., 2018, "A Normal Probability Model for Estimating Maximum Throughput of a Transport Link Based on Experimental 4G Base Station Data Analysis", **2018 IEEE 10th Latin-American Conference on Communications (LATINCOM)**, 16 November 2018, Guadalajara, Mexico, pp. 1-5.

8. Premaratne, U. and Premarathne, U. S., 2019, "A Sum of Bernoulli Sources Approximation for Packet Switched Network Traffic in Backbone Links", **IEEE Communications Letters**, 11 October 2019, Vol. 24, No. 1, pp. 141-145.

9. Nguyen, V.D., Bogachev, M.I., Markelov, O.A. and Vasenev, A.N., 2017, "Superstatistical Description of Aggregated Network Traffic with Two-Compound Access Rate Distribution", **2017 IEEE International Conference on Soft Computing and Measurements (SCM)**, 24-26 May 2017, St. Petersburg, Russia, pp. 57-60

10. Tamazian, A., Nguyen, V.D., Markelov, O.A., Bogachev, M.I., 2016, "Universal Model for Collective Access Patterns in The Internet Traffic Dynamics: A Superstatistical Approach", **EPL (Europhysics Letters)**, Vol. 115, No. 1.

11. Rakesh, S., Shiv, D.J. and Rajendra, K.P.B, 2009, "Offered-Load Model for Pareto Inter-Arrival Network Traffic", **2009 IEEE 34th Conference on Local Computer Networks**, 20-23 October 2009, Zurich, Switzerland, pp. 364-367.

12. Ming, X., Wu, Y., Suili, F. and Hui S., 2005, "Performance of a Queuing Model with Pareto Input Traffic for Wireless Network Nodes", **2005 International Conference on Wireless Communications Networking and Mobile Computing**, 26-26 September 2005, Wuhan, China, pp. 867-870.

13. Sheng, X., Bugong, X. and Dazhou, P., 2006, "The Waiting Time Distribution of a Pareto Service Self-Similar Queuing Model for Wireless Network Nodes", **2006 International Conference on Wireless Communications Networking and Mobile Computing**, 22-24 September 2006, Wuhan, China, pp. 1-3.

14. Araik, T. and Mikhali, B., 2015, "Analytical and Numerical Estimates of the Weibull/M/1 and Weibull/Weibull/1 Queues Efficiency", **2015 IEEE NW Russia Young Researchers in Electrical and Electronic Engineering Conference (EIConRusNW)**, 2-4 February 2015, St. Petersburg, Russia, pp. 110-113.

15. Xiaolong, J and Geyong, M., 2008, "QoS Analysis of Queuing Systems with Self-Similar Traffic and Heavy-Tailed Packet Sizes", **2008 IEEE International Conference on Communications**, 19-23 May 2008, Beijing, China, pp. 100-104.

16. Strelkovskaya, I. and Solovskaya, I.,2017, "Probabilistic and Time Characteristics of the G/M/1 QS with the Weibull Distribution of Arrivals", **2017 International Conference on Information and Telecommunication Technologies and Radio Electronics (UkrMiCo)**, 11-15 September 2017, Odessa, Ukraine, pp. 1-4.

17. Jian, Y. and Kevin, L.M., 2006, "Simulating Timescale Dynamics of Network Traffic Using Homogeneous Modeling", **Journal of Research of the National Institute of Standards and Technology**, vol. 111, No.3, pp. 227-242.

18. Mohsen, H., 2017, "Source Traffic Modeling Using Pareto Traffic Generator", **Journal of Computer Networks**, Vol. 4, No. 1, 2017, pp 11-19.

19. Kadir, N., 2015, "Observation of the Common Phenomena from a MATLAB Model for M/M/1 Queuing System", **2015 3rd International Conference on Advances in Electrical Engineering,** 17-19 December 2015, Dhaka, Bangladesh, pp. 210-212.

20. Kayvan, A., Amirali, R., Saadiah, Y. and Alireza, E., 2016, "Traffic Behavior of Local Area Network Based on M/M/1 Queuing Model Using Poisson and Exponential Distribution", **2016 IEEE Region 10 Symposium (TENSYMP)**, 9-11 May 2016, Bali, Indonesia. pp. 19-23.

21. Van, M., N. and Son, V. Q., 2015, "Applying Queuing Theory to Evaluate Performance of Cluster Wireless Sensor Networks", **2015 International Conference on Advanced Technologies for Communications (ATC)**, 14-16 October 2015, Ho Chi Minh City, Vietnam, pp. 501-506.

22. Guo, S., Wu, D., Zhang, H. and Yuan, D., 2018, "Resource Modeling and Scheduling for Mobile Edge Computing: A Service Provider's Perspective", **IEEE Access**, 28 June 2018, Vol. 6, pp. 35611-35623.

23. Guo, S., Wu, D., Zhang, H. and Yuan, D., 2018, "Queueing Network Model and Average Delay Analysis for Mobile Edge Computing", **2018 International Conference on Computing, Networking and Communications (ICNC)**, 5-8 March 2018, Maui, HI, USA, pp. 172-176.

24. Le, L. B., Nguyen, A. T. and Hossain, E., 2007, "A Tandem Queue Model for Performance Analysis in Multihop Wireless Networks", **2007 IEEE Wireless Communications and Networking Conference**, 11-15 March 2007, Kowloon, Hongkong, pp. 2981-2985.

25. Kattepur A. and Nambiar M.,2015, "Performance Modeling of Multi-tiered Web Applications with Varying Service Demands", **2015 IEEE International Parallel and Distributed Processing Symposium Workshop**, Hyderabad, India, pp. 415-424.

26. Yang K. and Shan H., 2018, "Analysis of Queueing Networks with Geo/Geo/1 Clients and Batch Service Queue", **2018 10th International Conference on Wireless Communications and Signal Processing (WCSP)**, 18-20 October 2018, Hangzhou, pp. 1-6.

27. Tickoo, O. and Sikdar, B., 2004, "Queueing Analysis and Delay Mitigation in IEEE 802.11 Random Access MAC Based Wireless Networks", **IEEE INFOCOM 2004**, 7-11 March 2004, Hong Kong, China, pp. 1404-1413.

28. PalunčIć, F., Alfa, A. S., Maharaj, B. T. and Tsimba, H. M., 2018, "Queueing Models for Cognitive Radio Networks: A Survey", **IEEE Access**, vol. 6, pp. 50801-50823.

29. Ehsanifar, M., Hamta, N. and Hemesy, M., 2017, "A Simulation Approach to Evaluate Performance Indices of Fuzzy Exponential Queuing System (An M/M/C Model in a Banking Case Study)", **Journal of Industrial Engineering and Management Studies**, Vol. 4, No. 2, pp. 35-51.

30. Ghaleb, M. A., Suryahatmaja, U. S. and Alharkan, I. M., 2015, “Modeling and Simulation of Queuing Systems Using Arena Software: A Case Study”, **2015 International Conference on Industrial Engineering and Operations Management (IEOM),** 3-5 March 2015, Dubai, United Arab Emirates, pp. 1-7.

APPENDIX

Time-series Model Fitting Parameters

Readout

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(7, 0, 0)	11969.7609	12009.2277	[0.40420382 -0.10054952 0.01584684 0.05280157 -0.04005754 0.00472558 0.12334987]		3977.92877	Not Significant
(7, 0, 1)	11971.6354	12015.4873	[0.44316058 -0.12101688 0.01747834 0.04861857 -0.045319 0.00375304 0.11804678]	[-0.04418571]	3977.92886	Not Significant
(7, 0, 2)	11972.2006	12020.4377	[0.19481934 0.225248 -0.11281796 0.07950467 -0.04446215 -0.01253386 0.13798871]	[0.20245149 -0.25495085]	3977.9285	Not Significant
(7, 0, 3)	11973.093	12025.7153	[0.17843818 0.24302941 -0.0345437 0.04591955 -0.0321557 -0.01124207 0.13898539]	[0.21774412 -0.26849667 -0.08675326]	3526.46464	Not Significant
(7, 0, 4)	11973.4435	12030.451	[0.50538488 0.24151596 0.00176545 -0.3265068 0.08777762 -0.05257152 0.14114832]	[-0.10902901 -0.3986171 -0.13613383 0.35760861]	3006.2243	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(7, 0, 5)	11973.9856	12035.3783	[0.67613993 0.35657439 -0.3207774 -0.26582828 0.0445595 -0.05581291 0.13520928]	[-0.2854121 -0.57565492 0.14554497 0.43672816 0.03837277]	3186.80579	Not Significant
(3, 0, 5)	11995.7317	12039.6005	[-0.14281602 0.0857994 0.63960493]	[0.54483562 0.02650825 -0.66144 -0.17692133 0.01978191]	3121.04245	Not Significant
(5, 0, 5)	11995.8401	12048.4826	[1.02978913 -0.45620546 0.64183017 -0.95586319 0.28987789]	[-0.63741965 0.09947736 -0.5553861 0.78213581 -0.00082506]	3362.72409	Not Significant
(6, 0, 4)	11996.1084	12048.751	[0.69012345 -0.81113695 0.5423733 0.18257482 -0.12090373 0.09995611]	[-0.28879427 0.58599593 -0.25740145 -0.29060542]	3111.4221	Not Significant
(6, 0, 5)	11996.325	12053.3545	[1.03718776 -0.50850612 0.64371661 -0.82179807 0.12782452 0.06367329]	[-0.63886816 0.15582838 -0.53341103 0.64697272 0.09276966]	3398.29496	Not Significant
(6, 0, 3)	11996.8292	12045.0849	[0.96974652 -1.11528789 0.82493768 -0.20491029 -0.01988764 0.07716494]	[-0.56970513 0.78650078 -0.45031157]	3526.46358	Not Significant
(6, 0, 0)	11997.3828	12032.4778	[0.40918617 -0.10850563 0.02487057 0.06111891		4571.16985	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
			-0.05844921 0.05415718]			
(2, 0, 5)	11997.7262	12037.2081	[-0.08376154 0.66149961]	[0.487813 -0.5852488 -0.29171113 0.026337 0.08603926]	3152.24876	Not Significant
(0, 0, 5)	11998.0068	12028.7149		[0.4090467 0.06439737 -0.00467658 0.06036843 0.01220615]	7362.21231	Not Significant
(6, 0, 2)	11998.4623	12042.3311	[0.80941922 -0.66208886 0.22054388 0.01778918 -0.09622904 0.09480215]	[-0.40275123 0.39343663]	4571.16975	Not Significant
(1, 0, 5)	11998.8142	12033.9092	[0.58185602]	[-0.17487401 -0.177337 -0.04434864 0.06577213 -0.01027963]	3103.26752	Not Significant
(6, 0, 1)	11999.2014	12038.6833	[0.4469349 -0.12959916 0.0251916 0.05641125 -0.06602367 0.0549811]	[-0.0436393]	4571.16994	Not Significant
(4, 0, 5)	12001.3074	12049.563	[0.27594833 0.76514846 -0.06557364 -0.42581068]	[0.12351924 -0.86185377 -0.32160847 0.48139574 0.26438769]	3323.69615	Not Significant
(4, 0, 4)	12010.3056	12054.1912	[0.6879068 -0.89588923 0.84858864 -0.05859373]	[-0.29616562 0.69492675 -0.52976949 -0.19357995]	3153.57273	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 4)	12013.5304	12053.0274	[-0.09941517 0.02523004 0.65751086]	[0.50426029 0.07765593 -0.65601452 -0.1840096]	3113.20115	Not Significant
(0, 0, 4)	12015.9303	12042.2617		[0.40800272 0.06589136 -0.00878757 0.05707804]	7275.32582	Not Significant
(1, 0, 4)	12016.8929	12047.6128	[0.53162475]	[-0.12276802 -0.15973504 -0.04856102 0.06449981]	3468.57854	Not Significant
(5, 0, 3)	12016.9255	12060.8111	[0.07396086 -0.08613741 0.62562772 -0.16549973 0.0746325]	[0.32766697 0.10443008 -0.6061413]	3561.07678	Not Significant
(5, 0, 0)	12017.1894	12047.9093	[0.40821583 -0.1064306 0.02139479 0.0578833 -0.03596707]		4840.17244	Not Significant
(5, 0, 4)	12017.418	12065.6921	[-0.16959812 0.00712755 0.70257083 0.02945837 0.01261004]	[0.56706012 0.10754904 -0.68957038 -0.22234808]	3136.36831	Not Significant
(2, 0, 4)	12018.3205	12053.4289	[0.3617093 0.18622625]	[0.04362452 -0.27265213 -0.10807327 0.05485442]	3355.28436	Not Significant
(5, 0, 1)	12019.1725	12054.281	[0.39585882 -0.0993951 0.0212307 0.05977333 -0.03428696]	[0.01427321]	4840.17255	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 2)	12021.2881	12060.7851	[0.39374113 -0.04704247 -0.00120138 0.06529496 -0.03049848]	[0.01540598 -0.05245027]	4571.16978	Not Significant
(4, 0, 0)	12035.6287	12061.9702	[0.40616696 -0.11109583 0.02795894 0.04374434]		4671.83751	Not Significant
(3, 0, 3)	12035.6313	12070.7533	[0.18511126 0.04336729 0.26520368]	[0.21227328 -0.0669913 -0.30444278]	3758.58628	Not Significant
(0, 0, 3)	12035.886	12057.8372		[0.41158999 0.05417889 -0.02755681]	7153.90503	Not Significant
(4, 0, 3)	12036.3508	12075.863	[0.19304598 -0.05546203 0.47803162 -0.08839321]	[0.20580697 0.04116287 - 0.46820607]	3513.83942	Not Significant
(1, 0, 3)	12037.2874	12063.6289	[0.48359466]	[-0.07530638 -0.13385946 -0.02235954]	3815.21001	Not Significant
(2, 0, 3)	12037.4325	12068.1642	[0.0891449 0.40250519]	[0.32050458 -0.366525 -0.16426215]	3769.83992	Not Significant
(4, 0, 1)	12037.6185	12068.3502	[0.39655032 -0.10533655 0.02756869 0.04633215]	[0.01130856]	4671.83763	Not Significant
(4, 0, 2)	12039.2613	12074.3832	[0.21684764 0.16717591 -0.08067345 0.0779692]	[0.18794386 -0.20147442]	4571.16726	Not Significant
(3, 0, 0)	12054.1513	12076.1108	[0.41055066 -0.11793694 0.04554977]		4888.70662	Not Significant
(0, 0, 2)	12054.2593	12071.827		[0.41382827 0.06395601]	6981.5091	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 2)	12055.0057	12076.9653	[0.35598596]	[0.05046057 -0.08428683]	4757.01903	Not Significant
(3, 0, 1)	12056.1407	12082.4922	[0.4176338 -0.12265748 0.04491714]	[-0.00898487]	4888.70671	Not Significant
(2, 0, 2)	12056.8869	12083.2384	[0.39076155 -0.03475811]	[0.01768031 -0.06557541]	4757.50618	Not Significant
(3, 0, 2)	12057.3005	12088.0439	[0.57056698 -0.34524226 0.12874784]	[-0.15884224 0.16342791]	4759.63184	Not Significant
(2, 0, 0)	12083.8014	12101.3758	[0.40175311 -0.10343056]		5217.3287	**Significant**
(2, 0, 1)	12086.2358	12108.2037	[0.4505871 -0.11276221]	[-0.04517821]	4888.70652	Not Significant
(1, 0, 1)	12086.3905	12103.9649	[0.28473526]	[0.12940129]	5157.13781	Not Significant
(0, 0, 1)	12087.251	12100.4318		[0.38206223]	6826.2228	Significant
(1, 0, 0)	12107.9789	12121.1647	[0.36511179]		4714.66168	Significant
(0, 0, 0)	12191.7289	12200.5194			7413.99167	Significant

Readout-qc

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	3859.85315	3892.53173	[-0.45664378 0.22382473 0.74020125]	[0.79581041 0.00726556 -0.7454509 -0.07098379 0.05535101]	2594.01126	Not Significant
(4, 0, 5)	3860.97337	3896.91981	[0.47263139 0.23718675 0.54884997 -0.73851612]	[-0.17065372 -0.33606625 -0.64465901 0.71672271 0.2182139]	2572.96168	Not Significant
(0, 0, 5)	3864.10383	3886.97884		[0.29209051 0.07873075 0.0579559 0.1313856 0.02596514]	4986.13419	Not Significant
(1, 0, 5)	3866.75952	3892.90238	[0.42365155]	[-0.13837923 -0.04809355 0.02409202 0.10547939 -0.02253019]	3070.30602	Not Significant
(2, 0, 5)	3867.45411	3896.86483	[-0.07101025 0.51300867]	[0.36342688 -0.44780146 -0.10038209 0.09558823 0.10292529]	2971.12245	Not Significant
(3, 0, 4)	3876.57928	3906.03627	[-0.32514936 0.06529815 0.74025156]	[0.64646106 0.1551911 -0.70514267 -0.08574629]	2757.26992	Not Significant
(4, 0, 4)	3878.09776	3910.82775	[-0.92644815 0.02277485 0.84960181 0.53196299]	[1.23854069 0.33138012 -0.7542461 -0.59947566]	2789.07421	Not Significant
(0, 0, 4)	3879.95579	3899.59379		[0.28470324 0.08903405 0.06533138 0.12734501]	4970.1009	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 4)	3881.49231	3904.40331	[0.4713698]	[-0.18504682 -0.07011076 0.03103837 0.08673522]	2807.45464	Not Significant
(2, 0, 4)	3883.22107	3909.40507	[0.33850416 0.1506735]	[-0.05727005 -0.17844402 -0.00266648 0.09183928]	2721.91358	Not Significant
(3, 0, 3)	3894.3759	3920.60082	[-0.21534815 0.0707402 0.67938225]	[0.4973081 0.08499296 -0.64377928]	2454.72952	Not Significant
(4, 0, 0)	3897.56591	3917.2346	[0.28238984 -0.01633492 0.07931542 0.09212204]		2964.24624	Not Significant
(4, 0, 3)	3898.07064	3927.57367	[1.24131478 -1.38270698 0.86187059 -0.14731035]	[-0.97392996 1.16153408 -0.47675235]	2263.76717	Not Significant
(1, 0, 3)	3899.49089	3919.15958	[0.49752346]	[-0.21830441 -0.07126873 0.07533617]	2680.2281	Not Significant
(4, 0, 1)	3899.56414	3922.51094	[0.27102231 -0.0112843 0.08031571 0.09523942]	[0.01299791]	2964.24632	Not Significant
(0, 0, 3)	3899.66066	3916.05123		[0.28254148 0.05777987 0.06899471]	5082.01695	Not Significant
(2, 0, 3)	3900.96293	3923.90973	[-0.06939142 0.56195465]	[0.35606956 -0.45464876 -0.05879119]	2711.94324	Not Significant
(4, 0, 2)	3901.54818	3927.77309	[0.25720751 -0.02107692 0.08454867 0.09734317]	[0.02727979 0.01435138]	3053.14242	Not Significant
(3, 0, 0)	3916.6715	3933.08752	[0.2966987 -0.02611842 0.10931742]		3251.8697	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(0, 0, 2)	3917.82256	3930.95538		[0.30029434 0.04733989]	5102.66248	Not Significant
(3, 0, 2)	3917.83227	3940.8147	[0.83465163 -0.94858479 0.416891]	[-0.48038812 0.80962108]	3129.09147	**Significant**
(1, 0, 2)	3918.50753	3934.92355	[0.42490665]	[-0.12436123 -0.05029896]	3055.57458	Not Significant
(3, 0, 1)	3918.5729	3938.27213	[0.33285959 -0.04652609 0.10428937]	[-0.04552618]	3251.86974	Not Significant
(2, 0, 2)	3918.98574	3938.68497	[0.01291057 0.41597247]	[0.26503721 -0.34012402]	3034.53125	Not Significant
(0, 0, 1)	3936.53056	3946.39536		[0.28309256]	4948.90391	Significant
(1, 0, 1)	3937.07311	3950.22618	[0.33791]	[-0.05279037]	3460.59394	Not Significant
(2, 0, 0)	3937.09936	3950.25242	[0.28857196 0.01071731]		3651.86779	Not Significant
(2, 0, 1)	3939.03331	3955.47464	[0.38867925 -0.0098359]	[-0.10637528]	3251.86949	Not Significant
(1, 0, 0)	3956.87734	3966.75726	[0.28611654]		3763.94651	Significant
(0, 0, 0)	3971.88191	3978.46852			5254.695	Significant

Readout-stfb

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(7, 0, 0)	12340.5196	12380.358	[0.40668399 -0.00628754 -0.07760332 0.06944294 -0.02051023 0.03880947 0.11532461]		2739.48965	Not Significant
(7, 0, 2)	12341.4675	12390.1589	[0.05886242 0.49282824 -0.23427228 0.04268743 0.0192449 0.01711275 0.13787526]	[0.34240991 -0.37256346]	2739.48894	Not Significant
(7, 0, 1)	12342.2932	12386.5581	[0.46105587 -0.03416639 -0.08037366 0.07003057 -0.02728797 0.03578818 0.10799293]	[-0.06053122]	2739.48976	Not Significant
(7, 0, 3)	12342.5604	12395.6782	[0.0304899 0.54903835 -0.17539227 0.00850619 0.02657151 0.02469221 0.13385867]	[0.37005202 -0.41903758 -0.07852967]	2364.21702	Not Significant
(7, 0, 5)	12344.8665	12406.8373	[0.08780398 0.68301533 -0.10705194 -0.34594544 0.18229073 0.03202234 0.09241632]	[0.30575068 -0.56490181 -0.20304845 0.29876296 -0.04113966]	2193.61149	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(7, 0, 4)	12346.447	12403.9914	[0.45210669 0.32525556 -0.30327849 -0.07286753 0.06274201 0.00641935 0.12059977]	[-0.06377816 -0.35909462 0.10136938 0.19374015]	2349.94099	Not Significant
(5, 0, 5)	12362.7683	12415.9056	[0.44076879 0.65323853 -0.35862011 -0.54484178 0.41111458]	[-0.04593893 -0.66884088 0.00498296 0.6127693 -0.14727363]	2320.42176	Not Significant
(6, 0, 0)	12366.0803	12401.5052	[0.41659191 -0.00823769 -0.0704844 0.06267424 -0.02082313 0.08701275]		3071.68923	Not Significant
(6, 0, 3)	12367.2244	12415.9336	[0.45086448 -0.48779353 0.6975476 -0.16928159 -0.02966898 0.13529063]	[-0.0520998 0.459885 -0.61304485]	2364.21455	Not Significant
(6, 0, 1)	12367.5853	12407.4382	[0.48188775 -0.04417675 -0.0750094 0.06300354 -0.03348834 0.08576511]	[-0.07469448]	3071.68931	Not Significant
(2, 0, 5)	12367.6801	12407.5331	[-0.18328559 0.77102852]	[0.59765478 -0.54603613 -0.31576679 -0.06116213 0.09422959]	2410.88987	Not Significant
(6, 0, 4)	12367.6907	12420.828	[0.98253666 -0.53448023 0.37565377 -0.39757443 0.06607878 0.10919216]	[-0.58083884 0.29649812 -0.33797936 0.36629565]	2329.2558	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(6, 0, 2)	12368.3426	12412.6237	[0.97978054 -0.72057663 0.12299632 0.11228519 -0.1325628 0.11489432]	[-0.57103805 0.47625422]	3071.68791	Not Significant
(6, 0, 5)	12368.755	12426.3204	[0.54507966 0.35284687 -0.54210513 -0.30468327 0.73339263 -0.15987351]	[-0.15028571 -0.38919053 0.33342206 0.48945737 -0.57685457]	2224.01641	Not Significant
(3, 0, 5)	12369.5756	12413.8567	[0.50596543 0.75352969 -0.68409935]	[-0.09517352 -0.82588366 0.26041576 0.19355855 0.17897734]	2461.7477	Not Significant
(1, 0, 5)	12370.0352	12405.46	[0.59549097]	[-0.18048618 -0.09092872 -0.1101254 0.05090218 0.01842049]	2348.44605	Not Significant
(0, 0, 5)	12371.1733	12402.17		[0.42119451 0.17263994 -0.00677394 0.03328428 -0.01145202]	5611.0932	Not Significant
(4, 0, 5)	12371.261	12419.9701	[1.11504168 -0.0868509 -0.64812213 0.21716463]	[-0.70857318 -0.21266466 0.47611673 0.08049277 0.02769097]	2349.72249	Not Significant
(3, 0, 4)	12382.8034	12422.6709	[-0.71853845 0.63484927 0.67521964]	[1.1170935 -0.21062395 -0.82727663 -0.26492568]	2435.48398	Not Significant
(5, 0, 4)	12385.0359	12433.7628	[0.41503978 0.75784406 -0.47442906 -0.415411 0.28761345]	[-0.0198268 -0.76722758 0.06244878 0.49973917]	2458.34392	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 2)	12387.0544	12426.9219	[-0.05954107 0.70069384 -0.29891714 0.0175726 0.11562197]	[0.47062067 -0.51879071]	3071.68316	Not Significant
(1, 0, 4)	12387.1263	12418.1343	[0.60339475]	[-0.18645484 -0.08924864 -0.10860445 0.0547563]	2297.67601	Not Significant
(5, 0, 0)	12387.7127	12418.7208	[0.41790911 -0.00275386 -0.0768494 0.0629791 0.01523248]		3357.5743	Not Significant
(2, 0, 4)	12388.2091	12423.6469	[0.24318562 0.34889103]	[0.17316066 -0.27913143 -0.18262481 0.00220974]	2369.24121	Not Significant
(5, 0, 3)	12388.3484	12432.6456	[0.24634195 0.66957041 -0.53108467 0.09017861 0.11500775]	[0.14912023 -0.61661895 0.20084162]	2391.02156	Not Significant
(0, 0, 4)	12388.4347	12415.013		[0.42153877 0.17130045 -0.00633385 0.03569884]	5555.24703	Not Significant
(5, 0, 1)	12389.7049	12425.1427	[0.42694878 -0.00785322 -0.07754547 0.06253764 0.01419756]	[-0.01034862]	3357.57444	Not Significant
(4, 0, 4)	12389.8601	12434.1572	[0.96905565 0.24328012 -1.03687182 0.40262635]	[-0.5625526 -0.50027503 0.80932165 -0.05032176]	2474.95714	Not Significant
(4, 0, 0)	12405.2952	12431.8832	[0.41901257 -0.00304983 -0.07718516 0.07013425]		3394.97482	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 3)	12405.5988	12445.4807	[-0.35876054 0.67308006 0.50129076 -0.21356247]	[0.76054297 -0.35163182 -0.6666045]	2333.77904	Not Significant
(2, 0, 3)	12405.6067	12436.626	[0.23049012 0.35748975]	[0.18580408 -0.28156079 -0.18380389]	2390.91459	Not Significant
(1, 0, 3)	12406.5528	12433.1408	[0.5827608]	[-0.15928232 -0.0681113 -0.08944443]	2402.13759	Not Significant
(0, 0, 3)	12406.6886	12428.8453		[0.42225844 0.16752531 -0.01721379]	5444.26443	Not Significant
(3, 0, 3)	12407.0979	12442.5485	[0.21830874 0.28610113 0.08218495]	[0.19265821 -0.21558478 -0.23556202]	2403.33161	Not Significant
(4, 0, 1)	12407.29	12438.3094	[0.42559035 -0.00686743 -0.07781981 0.06948336]	[-0.00776829]	3394.97495	Not Significant
(4, 0, 2)	12408.6455	12444.0961	[0.38553014 0.13876658 -0.13315231 0.07790115]	[0.03119295 -0.13394013]	3071.68912	Not Significant
(0, 0, 2)	12424.6728	12442.4046		[0.4259139 0.17646992]	5232.01473	**Significant**
(3, 0, 0)	12425.3002	12447.4649	[0.41578757 -0.00293586 -0.04819745]		3647.31337	Not Significant
(1, 0, 2)	12426.854	12449.0187	[0.38876805]	[0.02924375 0.01098529]	3457.5784	Not Significant
(3, 0, 1)	12427.2595	12453.8571	[0.39890056 0.00797329 -0.04679462]	[0.02015419]	3647.31352	Not Significant
(2, 0, 2)	12427.5376	12454.1352	[0.54741877 -0.15062395]	[-0.12722567 0.08680436]	3446.34048	Not Significant
(3, 0, 2)	12429.6848	12460.7154	[0.28433665 0.31553273 -0.14358447]	[0.12768263 -0.24682381]	3100.41162	Not Significant

ARIMA	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 0)	12444.2812	12462.0193	[0.41678653 -0.02211638]		3469.01303	Not Significant
(1, 0, 1)	12444.3549	12462.0931	[0.38045141]	[0.03512494]	3539.81136	Not Significant
(2, 0, 1)	12446.3483	12468.521	[0.36649117 -0.00121186]	[0.04809341]	3647.31363	Not Significant
(1, 0, 0)	12461.5473	12474.8558	[0.40778099]		3393.79308	Significant
(0, 0, 1)	12461.7542	12475.0578		[0.35586729]	5248.28534	Significant
(0, 0, 0)	12572.9656	12581.8379			5724.3936	Significant

Readout-stfb-qc

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 5)	(4, 0, 5, 30)	2059.77566	2115.30787	[-0.71802194 -0.42429729 -0.94204541 -0.23239225 0.14595945]	[0.82457448 0.10336665 0.80068127 0.09361089 -0.59301566]	4427.53223	Not Significant
(1, 0, 5)	(3, 0, 5, 30)	2060.05384	2102.3641	[-0.92953235]	[1.08741333 -0.1981621 -0.36197232 -0.27320619 -0.28563691]	4417.01764	Not Significant
(1, 0, 5)	(2, 0, 5, 30)	2060.2498	2099.91566	[-0.9582147]	[1.09571303 -0.21176417 -0.30119191 -0.1566307 -0.24603371]	4417.02921	Not Significant
(5, 0, 5)	(3, 0, 5, 30)	2060.46239	2113.35021	[-0.68901024 -0.17220035 -0.66087854 -0.72545999 0.13286347]	[0.7930567 -0.00203282 0.56535577 0.75964696 -0.07062154]	4427.53222	Not Significant
(2, 0, 5)	(5, 0, 5, 30)	2061.23339	2111.47682	[-1.31150566 -0.85639572]	[1.45018386 0.82957081 -0.26243934 -0.42637489 -0.06858778]	4316.31546	Not Significant
(5, 0, 5)	(5, 0, 5, 30)	2061.38092	2119.55752	[-0.69931958 -0.35028217 -0.90870158 -0.18837985 0.1898289]	[0.77516289 0.02144132 0.76504642 0.02613416 -0.64479779]	4427.53232	Not Significant
(2, 0, 5)	(3, 0, 5, 30)	2061.82049	2106.77513	[-1.36616714 -0.91419846]	[1.40704892 0.72704675 -0.39110068 -0.41038313 -0.04235086]	4316.3158	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	(5, 0, 5, 30)	2061.8556	2114.74342	[-1.60937188 -1.24938106 -0.47982884]	[1.65036657 1.05431564 0.04605013 -0.58853981 -0.35364427]	4305.39813	Not Significant
(5, 0, 5)	(2, 0, 5, 30)	2063.20515	2113.44857	[-0.83735846 -0.21176522 -0.6323503 -0.9223118 -0.08143523]	[0.8765057 0.01313576 0.60104815 1.07608834 0.18075872]	4427.53162	Not Significant
(4, 0, 5)	(4, 0, 5, 30)	2063.40961	2116.29742	[-0.32675339 -0.4915287 -0.30227006 -0.70976611]	[0.40837364 0.540105 0.15771791 0.88501098 0.19740178]	4224.65513	Not Significant
(4, 0, 5)	(3, 0, 5, 30)	2063.53332	2113.77674	[-0.36679774 -0.64624783 -0.32013743 -0.68776787]	[0.35626607 0.61882266 0.06385601 0.75854066 0.0254953]	4224.65516	Not Significant
(4, 0, 5)	(2, 0, 5, 30)	2063.60207	2111.2011	[-0.24004371 -0.56432861 -0.23739898 -0.73244579]	[0.22291179 0.53424945 0.08016943 0.91697483 0.07855741]	4224.65533	Not Significant
(4, 0, 5)	(5, 0, 5, 30)	2063.71386	2119.24607	[-0.46198128 -0.54272242 -0.32785636 -0.72405592]	[0.51682406 0.56209583 0.14460406 0.78618467 0.18333168]	4224.65503	Not Significant
(2, 0, 5)	(4, 0, 5, 30)	2063.80919	2111.40823	[-1.36026259 -0.89775532]	[1.41347536 0.72772258 -0.34516165 -0.37959371 -0.02854031]	4316.31612	Not Significant
(2, 0, 5)	(1, 0, 5, 30)	2064.36244	2104.0283	[-0.98019425 -0.80522275]	[0.92373511 0.61923472 -0.38259327 -0.22065107 -0.03237679]	4316.31609	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 5)	(2, 0, 5, 30)	2064.72466	2107.03491	[-1.36826203 -0.85519127]	[1.33483502 0.65029447 -0.40771539 -0.40824486 -0.10560589]	4316.31624	Not Significant
(1, 0, 5)	(5, 0, 5, 30)	2064.96208	2112.56111	[-0.72339865]	[0.85779091 -0.22734116 -0.22323716 -0.12885814 -0.17937015]	4417.03101	Not Significant
(5, 0, 5)	(1, 0, 5, 30)	2065.07597	2112.67501	[-0.30903739 0.12879606 -0.58442457 -0.57447335 0.35616031]	[0.35252045 -0.3457799 0.63074636 0.64841621 -0.38011995]	4427.53243	Not Significant
(3, 0, 5)	(3, 0, 5, 30)	2065.08375	2112.68279	[-0.7211111 -0.47007915 -0.54338545]	[0.72411255 0.22427569 0.26552175 -0.22460102 -0.13246071]	4305.39847	Not Significant
(1, 0, 5)	(4, 0, 5, 30)	2065.13023	2110.08488	[-0.53858988]	[0.58502566 -0.17290921 -0.15504994 -0.05397635 0.0781576]	4417.03201	Not Significant
(3, 0, 5)	(2, 0, 5, 30)	2065.41643	2110.37108	[-0.0506138 -0.04317035 -0.85633356]	[-0.04831391 -0.10078439 0.80187153 -0.02360046 -0.05735674]	4305.39777	Not Significant
(3, 0, 5)	(1, 0, 5, 30)	2065.55978	2107.87003	[-1.05713172 -1.02703044 -0.82460965]	[1.01417771 0.89163416 0.54634004 -0.30076267 -0.17108976]	4305.39882	Not Significant
(4, 0, 5)	(1, 0, 5, 30)	2065.73491	2110.68956	[-0.56434529 -0.59464903 -0.37821859 -0.81656919]	[0.56199592 0.48341111 0.21741782 0.78773533 0.06895665]	4224.65554	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	(4, 0, 5, 30)	2066.89455	2117.13798	[-0.79628596 -0.51332707 -0.36035506]	[0.80791593 0.28172196 0.08518004 -0.25654068 -0.09587372]	4305.39735	Not Significant
(1, 0, 5)	(1, 0, 5, 30)	2067.89541	2104.91688	[-0.44654715]	[0.42954935 -0.09914485 -0.21251683 -0.05322713 0.10598373]	4417.03304	Not Significant
(5, 0, 2)	(5, 0, 1, 30)	2072.42066	2112.23006	[-1.78548924 -1.19672012 -0.7204839 -0.76719541 -0.39585041]	[1.77664257 0.8539254]	2909.92666	Not Significant
(5, 0, 2)	(5, 0, 0, 30)	2074.12109	2111.27654	[-1.29809188 -1.13580172 -0.43818981 -0.39186223 -0.09408679]	[1.2905356 0.98246927]	2909.92536	Not Significant
(5, 0, 4)	(5, 0, 1, 30)	2075.66189	2120.77922	[-0.80389912 -0.22268929 -0.68234785 -0.82890704 0.04644863]	[0.83176278 0.04431758 0.56472912 0.82218939]	3733.71331	Not Significant
(2, 0, 4)	(5, 0, 5, 30)	2076.21462	2123.98591	[-1.30742806 -0.85604849]	[1.43391966 0.80224396 -0.28293785 -0.3818522]	3255.9779	Not Significant
(5, 0, 5)	(5, 0, 1, 30)	2076.25916	2124.03045	[-0.52828285 -0.05433501 -0.88616615 -0.56274139 0.12798015]	[0.58985675 -0.23849115 0.82994984 0.61329678 -0.34132553]	4427.53235	Not Significant
(5, 0, 4)	(3, 0, 5, 30)	2076.78173	2127.20697	[-0.80117985 -0.27289312 -0.68223 -0.78107196 0.0545936]	[0.89862475 0.09379934 0.54986934 0.78094054]	3733.71335	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 4)	(5, 0, 2, 30)	2077.04933	2124.82061	[-0.7905923 -0.20289482 -0.64803731 -0.78110302 0.08410552]	[0.83999258 0.03097709 0.51699582 0.79460314]	3733.71332	Not Significant
(5, 0, 4)	(5, 0, 3, 30)	2077.24808	2127.67333	[-0.81259717 -0.262944 -0.66647357 -0.75990995 0.05150401]	[0.89199467 0.07953506 0.52028815 0.74269086]	3733.71331	Not Significant
(5, 0, 1)	(5, 0, 1, 30)	2077.6342	2114.78965	[-0.8639398 -0.27450203 -0.34021336 -0.24784354 -0.05068433]	[0.79052966]	2791.85774	Not Significant
(4, 0, 4)	(4, 0, 5, 30)	2077.75065	2128.1759	[-0.69004258 -0.20229921 -0.88721544 -0.73299062]	[0.91156788 0.08661429 0.86417647 0.91122223]	3465.47587	Not Significant
(5, 0, 4)	(5, 0, 0, 30)	2077.90766	2120.37102	[-0.8729239 -0.32635068 -0.78029254 -0.90315685 -0.03676329]	[0.88680641 0.14102345 0.66758266 0.85574036]	3733.71302	Not Significant
(5, 0, 2)	(5, 0, 2, 30)	2078.42627	2120.88963	[-1.25932244 -1.03601518 -0.37893918 -0.33932813 -0.04209654]	[1.2333963 0.85981099]	2909.92773	Not Significant
(1, 0, 4)	(3, 0, 5, 30)	2078.53125	2118.34065	[-0.57054307]	[0.5992341 -0.1883464 -0.17200087 -0.11662061]	3289.16885	Not Significant
(5, 0, 4)	(4, 0, 5, 30)	2078.59493	2131.67413	[-0.82904111 -0.30502872 -0.65298321 -0.74977735 0.04618501]	[0.92596363 0.10572217 0.49493288 0.72531282]	3733.71336	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 5)	(5, 0, 3, 30)	2078.64735	2131.72655	[-0.79211433 -0.29426055 -0.91754756 -0.78672663 -0.10704825]	[0.89340903 0.0504334 0.82647375 0.84654155 -0.04109213]	4427.53225	Not Significant
(5, 0, 1)	(5, 0, 3, 30)	2078.76735	2121.23072	[-0.69450512 -0.26286741 -0.26207421 -0.21709261 0.00828344]	[0.67263883]	2791.8578	Not Significant
(5, 0, 2)	(5, 0, 4, 30)	2078.79675	2126.56804	[-1.56913081 -1.04733041 -0.61041545 -0.57998605 -0.25414251]	[1.53562021 0.6674463]	2909.92672	Not Significant
(5, 0, 0)	(5, 0, 1, 30)	2078.87334	2113.37482	[-0.0875934 -0.1584778 -0.18496282 -0.06951862 0.07881466]		2791.85815	Not Significant
(2, 0, 4)	(3, 0, 5, 30)	2078.88225	2121.34561	[-1.28464978 -0.79534421]	[1.25696543 0.50803017 -0.38642039 -0.34720402]	3255.97248	Not Significant
(5, 0, 0)	(5, 0, 2, 30)	2078.94042	2116.09587	[-0.07860889 -0.15389053 -0.16023404 -0.04344373 0.083063]		2791.85791	Not Significant
(5, 0, 2)	(5, 0, 3, 30)	2079.08501	2124.20234	[-1.14766868 -0.65859885 -0.3718505 -0.37725843 -0.09946915]	[1.13149122 0.39375273]	2909.92771	Not Significant
(5, 0, 4)	(5, 0, 4, 30)	2079.17984	2132.25904	[-0.86969169 -0.35492309 -0.66220981 -0.73041368 0.03494097]	[0.95640811 0.15533611 0.48499448 0.67527545]	3733.71337	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 1)	(5, 0, 2, 30)	2079.31753	2119.12693	[-0.72983361 -0.24580315 -0.28733707 -0.20316478 0.01340995]	[0.6763807]	2791.85784	Not Significant
(5, 0, 5)	(5, 0, 2, 30)	2079.33259	2129.75783	[-0.62311067 -0.08239858 -0.64896765 -0.69914487 0.21522539]	[0.66546247 -0.07879403 0.56387487 0.71578713 -0.15534555]	4427.53238	Not Significant
(4, 0, 4)	(3, 0, 5, 30)	2079.41178	2127.18306	[-0.64164067 -0.28612319 -0.79908698 -0.73387564]	[0.67585238 0.11551758 0.76942825 0.67927659]	3465.4759	Not Significant
(5, 0, 1)	(5, 0, 0, 30)	2079.54138	2114.04287	[-0.98318149 -0.25652144 -0.35235641 -0.25105143 -0.09260119]	[0.89504486]	2791.85705	Not Significant
(5, 0, 5)	(5, 0, 0, 30)	2079.9358	2125.05312	[-1.4838733 -0.839612 -1.05750782 -1.51777899 -0.65799771]	[1.47970307 0.72380045 0.98694847 1.51292391 0.59639754]	4427.53127	Not Significant
(4, 0, 4)	(5, 0, 5, 30)	2080.0519	2133.13111	[-0.78346563 -0.29035307 -0.68354212 -0.67233222]	[0.87616031 0.0520181 0.5385529 0.64746206]	3465.47593	Not Significant
(5, 0, 1)	(5, 0, 4, 30)	2080.05651	2125.17383	[-0.7729274 -0.29549442 -0.28933355 -0.23502981 -0.03072993]	[0.74901138]	2791.85724	Not Significant
(5, 0, 3)	(5, 0, 1, 30)	2080.13128	2122.59464	[-0.10868464 -0.10697677 -0.88506863 -0.04885077 -0.03995272]	[0.0343235 -0.03751502 0.82896293]	3759.74052	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 2)	(5, 0, 5, 30)	2080.19782	2130.62306	[-1.30751974 -0.75816001 -0.40795558 -0.42925148 -0.18784965]	[1.31093755 0.48294828]	2909.92753	Not Significant
(3, 0, 4)	(3, 0, 5, 30)	2080.24031	2125.35764	[-0.17934767 -0.05606455 -0.6958266]	[0.14231427 -0.14321624 0.59262989 -0.01312864]	3278.53402	Not Significant
(5, 0, 0)	(5, 0, 3, 30)	2080.32507	2120.13448	[-0.08193669 -0.17293829 -0.15870725 -0.05515566 0.07367572]		2791.85779	Not Significant
(1, 0, 4)	(4, 0, 5, 30)	2080.34533	2122.8087	[-0.60596131]	[0.64436805 -0.19124974 -0.17491492 -0.10308798]	3289.16906	Not Significant
(5, 0, 4)	(2, 0, 5, 30)	2080.44468	2128.21596	[-0.6560334 -0.08044782 -0.59708653 -0.78630867 0.09607076]	[0.71122948 -0.10020053 0.57704293 0.9123119]	3733.7133	Not Significant
(5, 0, 4)	(5, 0, 5, 30)	2080.63425	2136.36742	[-0.84319179 -0.32686219 -0.64627818 -0.7299613 0.04946892]	[0.94466724 0.12688723 0.48696872 0.70741331]	3733.71337	Not Significant
(2, 0, 4)	(4, 0, 5, 30)	2080.6434	2125.76073	[-1.15058742 -0.63891103]	[1.1640568 0.42295707 -0.29732317 -0.28019755]	3255.9786	Not Significant
(2, 0, 4)	(2, 0, 5, 30)	2080.86009	2120.66949	[-1.20796214 -0.75864605]	[1.15254472 0.52488296 -0.42405061 -0.31088989]	3255.97737	Not Significant
(1, 0, 4)	(5, 0, 5, 30)	2080.90577	2126.02309	[-0.6438967]	[0.68678636 -0.20058164 -0.19643748 -0.10944009]	3289.16946	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 3)	(5, 0, 2, 30)	2080.9597	2126.07703	[-0.09792343 -0.07660282 -0.77813437 -0.00987955 -0.00741171]	[0.03319633 -0.09526357 0.70679933]	3759.74105	Not Significant
(3, 0, 4)	(5, 0, 5, 30)	2081.4663	2131.89155	[-1.25166595 -0.74397133 -0.02732149]	[1.24535177 0.51222406 -0.27159919 -0.27798769]	3278.53342	Not Significant
(5, 0, 5)	(5, 0, 4, 30)	2081.4713	2137.20447	[-0.77024141 -0.43138647 -0.88390928 -0.38391127 0.15869016]	[0.84146483 0.14185616 0.72040775 0.24920827 -0.43970959]	4427.53204	Not Significant
(5, 0, 0)	(5, 0, 4, 30)	2081.6153	2124.07867	[-0.07621329 -0.15974314 -0.165745 -0.0530348 0.08222215]		2791.85384	Not Significant
(1, 0, 4)	(2, 0, 5, 30)	2081.62105	2118.77649	[-0.86662799]	[0.82133302 -0.2079299 -0.27716833 -0.12290689]	3289.16962	Not Significant
(5, 0, 1)	(5, 0, 5, 30)	2081.68676	2129.45804	[-0.80676312 -0.30550279 -0.29598426 -0.2460575 -0.05747629]	[0.78257556]	2791.8575	Not Significant
(3, 0, 4)	(2, 0, 5, 30)	2081.95573	2124.4191	[-0.0435371 -0.03849392 -0.8389756]	[-0.04449144 -0.06256117 0.79042411 0.0014633]	3278.53435	Not Significant
(5, 0, 4)	(1, 0, 5, 30)	2082.18913	2127.30646	[-0.71926709 -0.15316814 -0.60871058 -0.781874 0.05848609]	[0.79029841 -0.03151043 0.54333654 0.85513073]	3733.71332	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 3)	(5, 0, 3, 30)	2082.40312	2130.17441	[-0.18140319 -0.06819891 -0.76810225 -0.02642161 -0.00762071]	[0.11826477 -0.1312951 0.67175667]	3759.74054	Not Significant
(3, 0, 4)	(4, 0, 5, 30)	2082.55735	2130.32863	[-0.61410879 -0.34879882 -0.29077367]	[0.61327578 0.12591696 0.06609087 -0.16884133]	3278.53377	Not Significant
(2, 0, 4)	(1, 0, 5, 30)	2082.91409	2120.06954	[-1.04384603 -0.59264839]	[0.99932473 0.4076422 -0.32555597 -0.23228082]	3255.97989	Not Significant
(5, 0, 0)	(5, 0, 5, 30)	2083.56615	2128.68347	[-0.08474563 -0.15970338 -0.16601567 -0.05702386 0.08367326]		2791.85546	Not Significant
(4, 0, 4)	(2, 0, 5, 30)	2083.83477	2128.9521	[0.18312854 -0.02965209 -0.84653074 0.21289106]	[-0.30181115 -0.04367185 0.81070891 -0.23981412]	3465.47606	Not Significant
(5, 0, 0)	(5, 0, 0, 30)	2083.93401	2115.78154	[-0.04013482 -0.1442805 -0.16403555 -0.05619495 0.05243906]		2791.85864	Not Significant
(5, 0, 3)	(5, 0, 4, 30)	2084.08638	2134.51162	[-0.12477968 -0.05380314 -0.81157378 -0.00846741 -0.01328775]	[0.06663638 -0.11460243 0.73549976]	3759.74047	Not Significant
(1, 0, 4)	(1, 0, 5, 30)	2084.21057	2118.71206	[-0.55027123]	[0.53210584 -0.1005709 -0.20273026 -0.12314122]	3289.17056	Not Significant
(4, 0, 4)	(1, 0, 5, 30)	2084.82119	2127.28456	[-0.17334636 -0.56841604 -0.23685945 -0.69823799]	[0.12540472 0.51948817 0.08066117 0.8052508]	3465.47642	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 3)	(5, 0, 0, 30)	2084.94961	2124.75902	[-0.11870988 -0.22767569 -0.97152437 -0.08294584 -0.10967643]	[0.05267046 0.09547769 0.95336694]	3759.73463	Not Significant
(3, 0, 4)	(1, 0, 5, 30)	2085.28481	2125.09422	[0.37662233 -0.6030886 -0.27598419]	[-0.44900329 0.51636377 0.20455393 -0.0628991]	3278.53368	Not Significant
(5, 0, 3)	(5, 0, 5, 30)	2086.11186	2139.19107	[-0.18196473 -0.03444068 -0.75515993 -0.00552874 -0.01359668]	[0.13858133 -0.14823002 0.65735962]	3759.74062	Not Significant
(4, 0, 4)	(5, 0, 1, 30)	2092.92964	2135.54467	[-0.73657498 -0.2019015 -0.85808641 -0.76804299]	[0.8897229 0.06386416 0.80317318 0.88504394]	3465.47626	Not Significant
(4, 0, 5)	(5, 0, 1, 30)	2094.28014	2139.5586	[-0.38798144 -0.51844257 -0.33917893 -0.75665639]	[0.42010529 0.54609184 0.16636572 0.8763114 0.17769047]	4224.65492	Not Significant
(4, 0, 1)	(5, 0, 1, 30)	2094.53926	2129.16397	[-0.78907426 -0.24937685 -0.29998689 -0.20844336]	[0.72724319]	2757.29722	Not Significant
(4, 0, 4)	(5, 0, 2, 30)	2094.6522	2139.93067	[-0.73704942 -0.210944 -0.77182967 -0.74142085]	[8.53751157e-01 -5.81032472e-04 6.83928914e-01 8.25393162e-01]	3465.47618	Not Significant
(4, 0, 4)	(5, 0, 3, 30)	2094.8263	2142.7682	[-0.77015993 -0.28815842 -0.77810823 -0.83898664]	[0.85442921 0.1204665 0.71527412 0.84449171]	3465.47599	Not Significant
(4, 0, 2)	(5, 0, 1, 30)	2094.8795	2132.16765	[-1.05927177 -0.63591682 -0.34114224 -0.28839722]	[1.01061198 0.39067321]	2909.9239	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 5)	(5, 0, 2, 30)	2095.49821	2143.44011	[-0.40545924 -0.51477474 -0.33422503 -0.74672501]	[0.44139596 0.53953801 0.16045325 0.861381 0.1910671]	4224.65512	Not Significant
(4, 0, 1)	(5, 0, 3, 30)	2095.50955	2135.46114	[-0.69787336 -0.25828486 -0.25137753 -0.21220351]	[0.67884696]	2757.29693	Not Significant
(1, 0, 3)	(3, 0, 5, 30)	2095.89443	2133.18257	[-0.58292591]	[0.59870728 -0.24844752 -0.10593027]	3079.51503	Not Significant
(4, 0, 1)	(5, 0, 2, 30)	2096.11679	2133.40494	[-0.74330543 -0.24274638 -0.27876358 -0.20161732]	[0.69251878]	2757.29717	Not Significant
(4, 0, 4)	(5, 0, 4, 30)	2096.11803	2146.72337	[-0.76886945 -0.28028476 -0.75562368 -0.76083566]	[0.87058529 0.06890495 0.65441449 0.77223341]	3465.47609	Not Significant
(4, 0, 0)	(5, 0, 1, 30)	2096.2175	2128.17877	[-0.08933938 -0.16182673 -0.18691784 -0.05689584]		2757.2973	Not Significant
(4, 0, 0)	(5, 0, 2, 30)	2096.269	2130.89371	[-0.08248926 -0.16003762 -0.16528018 -0.03554392]		2757.29706	Not Significant
(4, 0, 2)	(5, 0, 0, 30)	2096.63824	2131.26295	[-0.32634493 -1.03903338 -0.1821822 -0.15686035]	[0.27882371 0.9168858]	2909.92555	Not Significant
(4, 0, 1)	(5, 0, 4, 30)	2096.87049	2139.48552	[-0.74133484 -0.27199205 -0.25855943 -0.20378401]	[0.73338082]	2757.29632	Not Significant
(4, 0, 3)	(5, 0, 1, 30)	2096.88831	2136.83989	[-0.1357958 -0.06724313 -0.84992029 -0.04220782]	[0.06009571 -0.0664821 0.779545]	3731.45955	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 5)	(5, 0, 0, 30)	2097.03552	2139.65054	[-0.37378664 -0.50237696 -0.3136437 -0.81895965]	[0.44154243 0.52915625 0.23242728 0.96080253 0.24067855]	4224.65455	Not Significant
(4, 0, 5)	(5, 0, 3, 30)	2097.10295	2147.7083	[-0.51504376 -0.59273497 -0.34469894 -0.69709164]	[0.55471543 0.58880229 0.12015283 0.73060679 0.16620858]	4224.65479	Not Significant
(4, 0, 1)	(5, 0, 0, 30)	2097.18162	2129.14289	[-0.74687669 -0.20468377 -0.27855312 -0.16849716]	[0.6785825]	2757.2973	Not Significant
(2, 0, 3)	(2, 0, 5, 30)	2097.34252	2134.63067	[0.90336944 -0.87887084]	[-1.05538127 0.92441681 -0.06907005]	3071.924	Not Significant
(1, 0, 3)	(4, 0, 5, 30)	2097.46361	2137.4152	[-0.64691207]	[0.68393151 -0.23584089 -0.12799138]	3079.51498	Not Significant
(4, 0, 3)	(5, 0, 2, 30)	2097.49949	2140.11451	[-0.15317258 -0.08200452 -0.67060584 -0.01860894]	[0.09519342 -0.10249148 0.56771833]	3731.46014	Not Significant
(4, 0, 0)	(5, 0, 3, 30)	2097.54575	2134.8339	[-0.0851977 -0.17834694 -0.1605017 -0.04664035]		2757.29683	Not Significant
(1, 0, 3)	(5, 0, 5, 30)	2097.96766	2140.58269	[-0.71638348]	[0.75403949 -0.23336396 -0.15326042]	3079.51468	Not Significant
(4, 0, 4)	(5, 0, 0, 30)	2097.9943	2137.94588	[-0.65242421 -0.54069897 -0.52588815 -0.88332086]	[0.60230662 0.39167099 0.38748146 0.79065046]	3465.47534	Not Significant
(2, 0, 3)	(1, 0, 5, 30)	2098.25873	2132.88344	[-0.15944517 -0.89948919]	[0.10322804 0.94550357 -0.14893635]	3071.9234	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 3)	(3, 0, 5, 30)	2098.37188	2138.32346	[0.73385353 -0.75070688]	[-0.85415925 0.70875366 -0.06865107]	3071.92404	Not Significant
(4, 0, 1)	(5, 0, 5, 30)	2098.55082	2143.82929	[-0.73044876 -0.26948481 -0.24080658 -0.20045728]	[0.72502018]	2757.29328	Not Significant
(4, 0, 3)	(5, 0, 3, 30)	2098.85402	2144.13248	[-0.2292064 -0.12118323 -0.58125182 -0.03785401]	[0.19514596 -0.09123641 0.4637366]	3731.46026	Not Significant
(4, 0, 0)	(5, 0, 4, 30)	2098.91732	2138.86891	[-0.08051689 -0.16803765 -0.16825184 -0.04563289]		2757.29386	Not Significant
(4, 0, 5)	(5, 0, 4, 30)	2099.13866	2152.40744	[-0.46030427 -0.55590935 -0.33527966 -0.71622211]	[0.49711179 0.56993768 0.13408175 0.7804903 0.16316281]	4224.65499	Not Significant
(4, 0, 3)	(3, 0, 5, 30)	2099.37184	2144.65031	[-0.1989891 -0.12567087 -0.69082837 -0.05250625]	[0.15255169 -0.06587386 0.58179433]	3731.46011	Not Significant
(3, 0, 3)	(2, 0, 5, 30)	2099.57838	2139.52997	[0.67612869 -0.6663477 -0.19781929]	[-0.81277162 0.66793859 0.14370839]	3226.02666	Not Significant
(4, 0, 2)	(5, 0, 2, 30)	2099.65235	2139.60394	[0.40701078 -0.47353391 -0.12674927 0.04967699]	[-0.49573319 0.39448377]	2909.9273	Not Significant
(2, 0, 3)	(5, 0, 5, 30)	2099.7441	2145.02257	[-0.61122281 -0.02629727]	[0.62135228 -0.21181161 -0.10412156]	3071.92299	Not Significant
(2, 0, 3)	(4, 0, 5, 30)	2099.76682	2142.38185	[0.53932445 -0.63109884]	[-0.63429683 0.55682874 -0.10118831]	3071.92317	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 3)	(1, 0, 5, 30)	2099.83536	2137.12351	[0.16034128 -0.83175415 0.29295689]	[-0.25435881 0.85698322 -0.51572899]	3226.02447	Not Significant
(3, 0, 3)	(3, 0, 5, 30)	2100.05339	2142.66841	[0.20892851 -0.31805306 -0.46471328]	[-0.31945425 0.22050547 0.36398154]	3226.02529	Not Significant
(3, 0, 3)	(4, 0, 5, 30)	2100.2983	2145.57677	[0.07087809 -0.19247041 -0.54467318]	[-0.11788564 0.02544287 0.47458062]	3226.02571	Not Significant
(4, 0, 3)	(5, 0, 4, 30)	2100.68794	2148.62985	[-0.11541429 -0.04871608 -0.72576352 0.00083202]	[0.06362552 -0.11980519 0.63607967]	3731.46023	Not Significant
(4, 0, 0)	(5, 0, 5, 30)	2100.75192	2143.36694	[-0.08318215 -0.16222023 -0.1669838 -0.04589229]		2757.29506	Not Significant
(4, 0, 0)	(5, 0, 0, 30)	2100.88615	2130.18398	[-0.03805884 -0.14230434 -0.16187742 -0.04226879]		2757.2979	Not Significant
(4, 0, 3)	(2, 0, 5, 30)	2100.89099	2143.50602	[-0.02444566 -0.03201567 -0.8347698 0.01065056]	[-0.05999733 -0.06533438 0.79005159]	3731.46043	Not Significant
(4, 0, 3)	(4, 0, 5, 30)	2101.32908	2149.27098	[-0.13114446 -0.07764886 -0.73333293 -0.02068447]	[0.0812444 -0.09508295 0.64575946]	3731.4601	Not Significant
(4, 0, 2)	(5, 0, 3, 30)	2101.43117	2144.0462	[0.23724965 -0.42016249 -0.14653444 0.01170799]	[-0.30997555 0.32472833]	2909.92662	Not Significant
(1, 0, 3)	(2, 0, 5, 30)	2101.44154	2136.06625	[-0.17055645]	[0.09843693 -0.113894 -0.15174723]	3079.51662	Not Significant
(1, 0, 3)	(1, 0, 5, 30)	2101.65747	2133.61873	[-0.19748241]	[0.15652362 -0.09815577 -0.14267286]	3079.51705	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 3)	(3, 0, 5, 30)	2101.73663	2149.67853	[-0.09712387 -0.18281645 -0.87580886 -0.06608033 -0.07368846]	[0.03343436 0.00515909 0.83178406]	3759.741	Not Significant
(4, 0, 2)	(5, 0, 4, 30)	2101.82028	2147.09875	[0.2839739 -0.38866608 -0.1691991 0.04069298]	[-0.37880952 0.31405624]	2909.92663	Not Significant
(4, 0, 3)	(5, 0, 0, 30)	2102.41203	2139.70018	[-0.18418032 -0.16987918 -0.79529978 -0.01728583]	[0.15598105 0.0853878 0.67407058]	3731.45582	Not Significant
(4, 0, 3)	(5, 0, 5, 30)	2102.77949	2153.38483	[-0.39103856 -0.21994808 -0.65658357 -0.10370918]	[0.35912536 0.03515342 0.49578135]	3731.45953	Not Significant
(5, 0, 3)	(2, 0, 5, 30)	2102.84254	2148.12101	[-0.01372546 -0.05643335 -0.84007309 0.01121338 -0.02796632]	[-0.07173963 -0.05898924 0.79687847]	3759.7412	Not Significant
(3, 0, 3)	(5, 0, 5, 30)	2103.08123	2151.02313	[0.11596559 -0.07170545 -0.4543177]	[-0.22619012 -0.08959083 0.38907113]	3226.02566	Not Significant
(5, 0, 3)	(4, 0, 5, 30)	2103.37238	2153.97772	[-0.14348115 -0.08843049 -0.78690777 -0.02261931 -0.02769093]	[0.09396292 -0.09561967 0.70172795]	3759.74094	Not Significant
(4, 0, 2)	(5, 0, 5, 30)	2103.655	2151.5969	[0.7754988 -0.54031723 -0.0681593 0.09121896]	[-0.92406408 0.57082766]	2909.92804	Not Significant
(5, 0, 3)	(1, 0, 5, 30)	2106.29819	2148.91322	[-0.04309011 -0.44337784 -0.53992114 -0.0967861 -0.03202934]	[-0.02689041 0.30231134 0.43027966]	3759.74181	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 3)	(1, 0, 5, 30)	2107.14564	2147.09723	[0.43502869 0.45905623 -0.69355056 0.14846721]	[-0.3910652 -0.48316158 0.69484049]	3731.46213	Not Significant
(3, 0, 5)	(5, 0, 1, 30)	2109.92462	2152.68988	[-2.23928154 -1.97281406 -0.67567845]	[2.30953503 1.86615686 0.11165364 -0.80422833 -0.43080538]	4305.39392	Not Significant
(3, 0, 3)	(5, 0, 1, 30)	2113.57145	2150.99105	[-0.04101692 -0.08380604 -0.80749936]	[-0.02247788 -0.03002642 0.73659537]	3226.02576	Not Significant
(3, 0, 0)	(5, 0, 2, 30)	2113.74415	2145.81809	[-0.06207489 -0.1310277 -0.1478049]		2671.63184	Not Significant
(3, 0, 0)	(5, 0, 1, 30)	2113.88781	2143.28892	[-0.06382673 -0.12782158 -0.17020706]		2671.63218	Not Significant
(1, 0, 2)	(3, 0, 5, 30)	2114.36711	2149.11389	[-0.47823805]	[0.50827324 -0.18323625]	2737.59814	Not Significant
(3, 0, 3)	(5, 0, 2, 30)	2114.69135	2154.78378	[-0.01191135 -0.12237128 -0.74017242]	[-0.05844378 -0.02576917 0.6767652]	3226.02637	Not Significant
(3, 0, 1)	(5, 0, 1, 30)	2114.81429	2146.88824	[-0.86654173 -0.18345632 -0.15682552]	[0.84938887]	2671.6313	Not Significant
(5, 0, 2)	(2, 0, 5, 30)	2115.06649	2157.83175	[-1.76545275 -1.07289048 -0.48418966 -0.51353654 -0.27382753]	[1.78864545 0.87325256]	2909.92576	Not Significant
(3, 0, 0)	(5, 0, 3, 30)	2115.12863	2149.87541	[-0.06133908 -0.14414469 -0.14253348]		2671.63196	Not Significant
(3, 0, 4)	(5, 0, 1, 30)	2115.29944	2155.39187	[-0.073103 -0.05327124 -0.80936106]	[0.00625292 -0.07403927 0.73920219 -0.00812692]	3278.53367	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 2)	(5, 0, 0, 30)	2115.33391	2147.40786	[-0.25781223 -0.93583945 -0.11660779]	[0.23619862 0.95019683]	2886.11295	Not Significant
(2, 0, 2)	(2, 0, 5, 30)	2115.41033	2150.1571	[0.93665422 -0.86320311]	[-1.05155378 0.87314048]	2761.89876	Not Significant
(3, 0, 3)	(5, 0, 3, 30)	2115.5962	2158.36147	[-0.12784368 -0.10485421 -0.6394207]	[0.09452279 -0.09286962 0.54787859]	3226.02652	Not Significant
(3, 0, 1)	(5, 0, 3, 30)	2115.65827	2153.07787	[-0.72022444 -0.18803346 -0.10772632]	[0.75391706]	2671.63168	Not Significant
(3, 0, 1)	(5, 0, 2, 30)	2115.79843	2150.5452	[-0.11860483 -0.13359928 -0.15045973]	[0.06396596]	2671.63039	Not Significant
(3, 0, 2)	(5, 0, 1, 30)	2115.95332	2150.70009	[-0.0019125 -0.49545183 -0.19234615]	[-0.06318732 0.40898502]	2886.11613	Not Significant
(3, 0, 4)	(5, 0, 2, 30)	2115.95431	2158.71957	[-0.12043534 -0.06282787 -0.69265377]	[0.0692287 -0.11660877 0.60386812 0.00564497]	3278.53439	Not Significant
(3, 0, 3)	(5, 0, 0, 30)	2116.00766	2150.75443	[-1.03765338 -1.08197161 -0.87149124]	[1.07371505 1.15997417 0.86486225]	3226.02551	Not Significant
(3, 0, 1)	(5, 0, 0, 30)	2116.03983	2145.44094	[-0.89066643 -0.15562475 -0.1658051]	[0.86520038]	2671.63102	Not Significant
(1, 0, 2)	(5, 0, 5, 30)	2116.11443	2156.20686	[-0.54927255]	[0.60668432 -0.16871554]	2737.59751	Not Significant
(1, 0, 2)	(4, 0, 5, 30)	2116.15424	2153.57385	[-0.5257842]	[0.57492739 -0.15788901]	2737.5982	Not Significant
(2, 0, 2)	(3, 0, 5, 30)	2116.36228	2153.78189	[0.77917683 -0.73398983]	[-0.86816756 0.66209978]	2761.899	Not Significant
(3, 0, 0)	(5, 0, 4, 30)	2116.40417	2153.82378	[-0.05795095 -0.13493104 -0.15463254]		2671.62999	Not Significant
(3, 0, 1)	(5, 0, 4, 30)	2116.64855	2156.74098	[-0.76086683 -0.20257915 -0.11413361]	[0.8073185]	2671.63106	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 2)	(5, 0, 2, 30)	2116.67226	2154.09187	[0.17093548 -0.46668346 -0.16099937]	[-0.25104218 0.37227491]	2886.11595	Not Significant
(2, 0, 2)	(1, 0, 5, 30)	2116.79754	2148.87149	[-0.18290296 -0.90291586]	[0.25553094 0.98529938]	2761.8986	Not Significant
(3, 0, 4)	(5, 0, 0, 30)	2116.96704	2154.38665	[-1.03067382 -1.0237471 -0.821987]	[0.97033291 0.96356293 0.65120516 -0.14651134]	3278.53371	Not Significant
(2, 0, 2)	(5, 0, 5, 30)	2117.20421	2159.96947	[-1.15036302 -0.47043354]	[1.24776123 0.41958607]	2761.89866	Not Significant
(3, 0, 4)	(5, 0, 3, 30)	2117.22997	2162.66806	[-0.17863075 -0.11219821 -0.5994079]	[0.15215599 -0.09142506 0.49474955 -0.01447905]	3278.53407	Not Significant
(3, 0, 2)	(2, 0, 5, 30)	2117.27163	2154.69123	[0.86983218 -0.82698444 -0.04720804]	[-1.00984248 0.86073515]	2886.11665	Not Significant
(3, 0, 3)	(5, 0, 4, 30)	2117.29533	2162.73342	[-0.08845395 -0.07458239 -0.69399137]	[0.04055308 -0.10063805 0.61058536]	3226.02634	Not Significant
(3, 0, 2)	(5, 0, 4, 30)	2117.86489	2160.63016	[-0.68743018 -0.1290347 -0.13105489]	[0.7249988 -0.08989037]	2886.11475	Not Significant
(3, 0, 1)	(5, 0, 5, 30)	2117.94638	2160.71164	[-0.7823564 -0.20434065 -0.11124826]	[0.82742218]	2671.63147	Not Significant
(3, 0, 2)	(1, 0, 5, 30)	2118.03646	2152.78323	[-0.27015323 -0.91774856 -0.09575799]	[0.25338125 0.97210378]	2886.11651	Not Significant
(3, 0, 0)	(5, 0, 0, 30)	2118.03958	2144.76787	[-0.01764913 -0.11615623 -0.15203464]		2671.63278	Not Significant
(3, 0, 5)	(5, 0, 0, 30)	2118.06658	2158.15901	[-1.10029507 -1.03420576 -0.80074127]	[1.07845843 0.92740703 0.53176947 -0.28714245 -0.16286907]	4305.39793	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 2)	(3, 0, 5, 30)	2118.07612	2158.16855	[0.63414225 -0.6756521 -0.08286877]	[-0.74974125 0.63250902]	2886.11601	Not Significant
(2, 0, 2)	(4, 0, 5, 30)	2118.13471	2158.22714	[-0.55250297 -0.03863937]	[0.60389004 -0.12135491]	2761.89923	Not Significant
(3, 0, 0)	(5, 0, 5, 30)	2118.15674	2158.24918	[-0.05970119 -0.13359075 -0.15158809]		2671.63002	Not Significant
(3, 0, 2)	(5, 0, 3, 30)	2118.19214	2158.28458	[-0.08811509 -0.36709597 -0.178013]	[0.03359638 0.25382916]	2886.11629	Not Significant
(5, 0, 2)	(3, 0, 5, 30)	2118.43785	2163.87594	[-1.02327218 -0.55060106 -0.28003643 -0.29343464 -0.0396564]	[1.0444947 0.34531206]	2909.92701	Not Significant
(5, 0, 2)	(4, 0, 5, 30)	2118.4639	2166.57482	[-1.40007818 -0.96043971 -0.35018012 -0.39146688 -0.13433006]	[1.42157794 0.87033573]	2909.92749	Not Significant
(3, 0, 5)	(5, 0, 2, 30)	2118.52016	2163.95825	[-0.23517474 -0.0095676 -0.63133226]	[0.20410429 -0.16805443 0.50822791 0.01058012 0.03046192]	4305.39766	Not Significant
(3, 0, 2)	(4, 0, 5, 30)	2119.10865	2161.87391	[0.40872325 -0.52195358 -0.13642638]	[-0.51052997 0.45943707]	2886.11578	Not Significant
(4, 0, 2)	(2, 0, 5, 30)	2119.20415	2159.29658	[0.85835665 -0.79500285 -0.07199608 0.025529]	[-0.99883487 0.84718607]	2909.92804	Not Significant
(3, 0, 4)	(5, 0, 4, 30)	2119.39847	2167.50939	[-0.62820944 -0.33163729 -0.31776007]	[0.63437625 0.139281 0.12851738 -0.1368464]	3278.53371	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	(5, 0, 4, 30)	2119.54011	2170.32386	[-1.59865395 -1.05398396 -0.1960842]	[1.65826941 0.95648693 -0.12979379 -0.47666015 -0.21928778]	4305.39803	Not Significant
(4, 0, 2)	(3, 0, 5, 30)	2119.73715	2162.50241	[0.67156969 -0.59929539 -0.1130785 0.06997194]	[-0.79113785 0.59907267]	2909.92755	Not Significant
(3, 0, 5)	(5, 0, 3, 30)	2119.8038	2167.91472	[-0.17071392 -0.10841333 -0.58448681]	[0.15412717 -0.07024388 0.48455511 0.00614733 0.0293104]	4305.39816	Not Significant
(1, 0, 2)	(1, 0, 5, 30)	2120.0133	2149.41442	[-0.1196788]	[0.09818652 -0.0994406]	2737.59991	Not Significant
(1, 0, 2)	(2, 0, 5, 30)	2120.18101	2152.25496	[0.00795073]	[-0.06632566 -0.11890331]	2737.59936	Not Significant
(4, 0, 2)	(1, 0, 5, 30)	2120.57535	2157.99496	[-0.92662806 -0.65866336 -0.27189089 -0.21200988]	[0.86384968 0.5039266]	2909.92826	Not Significant
(4, 0, 2)	(4, 0, 5, 30)	2120.73889	2166.17698	[0.50120332 -0.47590613 -0.15369711 0.07436614]	[-0.61675224 0.46339313]	2909.92731	Not Significant
(3, 0, 2)	(5, 0, 5, 30)	2121.04788	2166.48597	[0.1787216 -0.40909115 -0.17579642]	[-0.26324437 0.32581513]	2886.11521	Not Significant
(5, 0, 2)	(1, 0, 5, 30)	2122.19149	2162.28392	[-1.11098656 -0.79231445 -0.29591295 -0.26497084 -0.0155018]	[1.08315252 0.62737774]	2909.92831	Not Significant
(2, 0, 4)	(5, 0, 1, 30)	2129.50994	2167.05978	[-1.32210154 -0.83700101]	[1.3762712 0.82247369 -0.265406 -0.29521356]	3255.97749	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 5)	(5, 0, 1, 30)	2130.95635	2171.18831	[-1.53871507 -0.70090472]	[1.69516583 0.72156137 -0.28251382 -0.44520602 -0.26448435]	4316.31592	Not Significant
(2, 0, 2)	(5, 0, 1, 30)	2132.44295	2164.62853	[-1.19109975 -0.79533948]	[1.24559399 0.98602037]	2761.8977	Not Significant
(2, 0, 4)	(5, 0, 0, 30)	2132.7516	2167.6193	[-1.30514659 -0.87121203]	[1.35936509 0.87748594 -0.19393515 -0.20970257]	3255.97625	Not Significant
(2, 0, 5)	(5, 0, 2, 30)	2132.89024	2175.80434	[-1.32803278 -0.84967863]	[1.40865742 0.90523277 -0.2188667 -0.29313734 -0.02621891]	4316.31591	Not Significant
(2, 0, 5)	(5, 0, 3, 30)	2132.90821	2178.50444	[-1.17805811 -0.24640142]	[1.39120675 0.22490966 -0.25457319 -0.29255651 -0.27790347]	4316.31466	Not Significant
(2, 0, 5)	(5, 0, 4, 30)	2132.92688	2181.20524	[-1.30987548 -0.36345866]	[1.52201925 0.38318921 -0.24465151 -0.27548853 -0.22761931]	4316.31541	Not Significant
(2, 0, 2)	(5, 0, 0, 30)	2133.46331	2162.96675	[-1.3856289 -0.93737847]	[1.38892153 0.98438575]	2761.89764	Not Significant
(2, 0, 3)	(5, 0, 0, 30)	2133.63207	2165.81765	[-1.04050485 -0.80689588]	[1.07430925 0.86922691 -0.10353566]	3071.92055	Not Significant
(2, 0, 0)	(5, 0, 2, 30)	2133.66514	2163.16859	[-0.00735413 -0.1116995]		2813.45473	Not Significant
(1, 0, 1)	(3, 0, 5, 30)	2133.8445	2166.03008	[-0.61574731]	[0.75715844]	2716.50097	Not Significant
(2, 0, 1)	(5, 0, 1, 30)	2134.0305	2163.53394	[-0.76877851 -0.05533854]	[0.78328734]	2671.63177	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 1)	(5, 0, 3, 30)	2134.05547	2168.92318	[-0.65079493 -0.09815511]	[0.72109917]	2671.63183	Not Significant
(2, 0, 0)	(5, 0, 1, 30)	2134.45391	2161.27522	[-0.00425351 -0.11074775]		2813.455	Not Significant
(2, 0, 1)	(5, 0, 4, 30)	2134.90148	2172.45132	[-0.69208645 -0.10398692]	[0.78077518]	2671.63108	Not Significant
(1, 0, 1)	(4, 0, 5, 30)	2134.92859	2169.79629	[-0.64514267]	[0.79708608]	2716.50109	Not Significant
(2, 0, 1)	(3, 0, 5, 30)	2135.064	2169.9317	[-0.63168834 -0.1043035]	[0.71339553]	2671.6303	Not Significant
(2, 0, 1)	(5, 0, 2, 30)	2135.06774	2167.25332	[-0.67343567 -0.07024619]	[0.71488038]	2671.63191	Not Significant
(2, 0, 0)	(5, 0, 3, 30)	2135.07481	2167.26038	[-0.00585602 -0.12480183]		2813.45469	Not Significant
(1, 0, 1)	(5, 0, 5, 30)	2135.34478	2172.89461	[-0.64981797]	[0.81675798]	2716.4994	Not Significant
(2, 0, 2)	(5, 0, 2, 30)	2135.46787	2170.33558	[0.5805825 -0.65510624]	[-0.59492651 0.52473934]	2761.89984	Not Significant
(2, 0, 5)	(5, 0, 0, 30)	2135.62118	2173.17102	[-1.32627712 -0.89518174]	[1.41816172 0.97156862 -0.15943632 -0.24686933 -0.04806154]	4316.31032	Not Significant
(2, 0, 4)	(5, 0, 2, 30)	2135.89676	2176.12873	[-1.33458921 -0.80559615]	[1.32219492 0.69482469 -0.23583966 -0.26074922]	3255.97743	Not Significant
(2, 0, 2)	(5, 0, 4, 30)	2136.00558	2176.23754	[-0.76258711 -0.16112206]	[0.86676673 0.08290304]	2761.89899	Not Significant
(2, 0, 1)	(5, 0, 0, 30)	2136.02532	2162.84664	[-0.77610743 -0.00633172]	[0.77626433]	2671.63143	Not Significant
(2, 0, 4)	(5, 0, 3, 30)	2136.13048	2179.04458	[-0.85187319 -0.35289979]	[0.91500275 0.27296772 -0.14227831 -0.18928662]	3255.97918	Not Significant
(2, 0, 3)	(5, 0, 1, 30)	2136.20488	2171.07258	[0.05260185 -0.6114505]	[-0.06570681 0.54898121 -0.13847392]	3071.92399	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 1)	(4, 0, 5, 30)	2136.26223	2173.81207	[-0.67030847 -0.09762538]	[0.76305787]	2671.63143	Not Significant
(2, 0, 3)	(5, 0, 2, 30)	2136.46799	2174.01783	[0.17719197 -0.52998315]	[-0.19957141 0.45195646 -0.130071]	3071.92418	Not Significant
(3, 0, 1)	(3, 0, 5, 30)	2136.49308	2174.04292	[-0.67007989 -0.15139683 -0.08992586]	[0.74416694]	2671.63126	Not Significant
(2, 0, 1)	(5, 0, 5, 30)	2136.50611	2176.73808	[-0.69290716 -0.10864505]	[0.79082668]	2671.63054	Not Significant
(2, 0, 0)	(5, 0, 4, 30)	2136.51123	2171.37894	[-0.00358313 -0.12047273]		2813.45234	Not Significant
(4, 0, 1)	(3, 0, 5, 30)	2136.61008	2176.84204	[-0.64580597 -0.17236594 -0.18338985 -0.16290573]	[0.69526162]	2757.2967	Not Significant
(1, 0, 1)	(2, 0, 5, 30)	2136.69798	2166.20142	[-0.81971215]	[0.83955336]	2716.50036	Not Significant
(2, 0, 4)	(5, 0, 4, 30)	2136.81038	2182.40661	[-1.00120272 -0.42958145]	[1.07157603 0.3219466 -0.16438704 -0.18114654]	3255.97911	Not Significant
(1, 0, 1)	(1, 0, 5, 30)	2137.58054	2164.40185	[-0.56478671]	[0.59264668]	2716.50185	Not Significant
(3, 0, 1)	(4, 0, 5, 30)	2137.60475	2177.83672	[-0.71003084 -0.15291974 -0.0969634]	[0.79390713]	2671.63183	Not Significant
(2, 0, 3)	(5, 0, 3, 30)	2137.75065	2177.98262	[-0.00709252 -0.52805404]	[-0.00554745 0.46422291 -0.14659817]	3071.92391	Not Significant
(2, 0, 2)	(5, 0, 3, 30)	2138.07404	2175.62387	[-0.51897915 -0.56914504]	[0.58773322 0.61371328]	2761.89949	Not Significant
(4, 0, 1)	(4, 0, 5, 30)	2138.14325	2181.05735	[-0.68118577 -0.17583418 -0.18572653 -0.15131239]	[0.73738065]	2757.29656	Not Significant
(2, 0, 0)	(5, 0, 5, 30)	2138.1624	2175.71224	[-0.01064715 -0.11926443]		2813.45219	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 1)	(3, 0, 5, 30)	2138.28057	2181.19467	[-0.57905284 -0.16141905 -0.16612127 -0.11961859 0.08493207]	[0.63444475]	2791.85766	Not Significant
(2, 0, 3)	(5, 0, 4, 30)	2138.36417	2181.27827	[0.13648059 -0.47000029]	[-0.16148755 0.41130279 -0.17215855]	3071.9233	Not Significant
(2, 0, 0)	(5, 0, 0, 30)	2138.59149	2162.73067	[0.0365839 -0.10940382]		2813.45553	Not Significant
(2, 0, 1)	(1, 0, 5, 30)	2139.16359	2168.66703	[0.09964193 -0.12098391]	[-0.095475]	2671.63276	Not Significant
(4, 0, 1)	(2, 0, 5, 30)	2139.4214	2176.97123	[-0.851794 -0.15128944 -0.25225068 -0.13386708]	[0.83535111]	2757.29609	Not Significant
(2, 0, 1)	(2, 0, 5, 30)	2139.46868	2171.65426	[0.22168866 -0.12981377]	[-0.24514414]	2671.63237	Not Significant
(3, 0, 1)	(1, 0, 5, 30)	2139.57441	2171.75998	[-0.15762861 -0.1008509 -0.13873477]	[0.15093392]	2671.63291	Not Significant
(3, 0, 1)	(2, 0, 5, 30)	2139.69355	2174.56125	[-0.15866379 -0.10962175 -0.1594616]	[0.12845313]	2671.63245	Not Significant
(5, 0, 1)	(4, 0, 5, 30)	2139.96911	2185.56534	[-0.62783086 -0.16644018 -0.17131724 -0.11666084 0.06949885]	[0.69014073]	2791.85745	Not Significant
(4, 0, 1)	(1, 0, 5, 30)	2141.03483	2175.90254	[-0.59618856 -0.11549332 -0.18551065 -0.10743633]	[0.57796118]	2757.29748	Not Significant
(5, 0, 1)	(1, 0, 5, 30)	2141.91985	2179.46969	[-0.30804343 -0.0987622 -0.14214914 -0.04155697 0.1269527]	[0.30668578]	2791.85888	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 1)	(2, 0, 5, 30)	2141.99799	2182.22996	[-0.49732347 -0.12179904 -0.18824185 -0.07862456 0.09856334]	[0.47196575]	2791.85841	Not Significant
(1, 0, 1)	(5, 0, 3, 30)	2153.19061	2185.48679	[-0.62074716]	[0.76279889]	2716.50146	Not Significant
(1, 0, 2)	(5, 0, 3, 30)	2154.21499	2189.20251	[-0.57081384]	[0.68058242 -0.06081138]	2737.59898	Not Significant
(1, 0, 1)	(5, 0, 4, 30)	2154.59961	2189.58713	[-0.64181446]	[0.80043239]	2716.50094	Not Significant
(1, 0, 1)	(5, 0, 2, 30)	2154.70257	2184.3074	[-0.64451476]	[0.74101546]	2716.50169	Not Significant
(1, 0, 0)	(5, 0, 2, 30)	2154.83066	2181.74414	[0.01622543]		2769.09102	Not Significant
(1, 0, 1)	(5, 0, 1, 30)	2154.86252	2181.776	[-0.77859725]	[0.81819433]	2716.50159	Not Significant
(1, 0, 3)	(5, 0, 3, 30)	2155.15129	2192.83016	[-0.59280855]	[0.69965041 -0.08905792 -0.03855729]	3079.516	Not Significant
(1, 0, 0)	(5, 0, 1, 30)	2155.51026	2179.73239	[0.02366992]		2769.09128	Not Significant
(1, 0, 2)	(5, 0, 2, 30)	2155.68804	2187.98421	[-0.54313928]	[0.60222352 -0.07965171]	2737.59937	Not Significant
(1, 0, 2)	(5, 0, 4, 30)	2155.74652	2193.42539	[-0.61136796]	[0.74718071 -0.039238]	2737.59919	Not Significant
(1, 0, 1)	(5, 0, 0, 30)	2155.76881	2179.99094	[-0.8974673]	[0.8790359]	2716.50048	Not Significant
(1, 0, 3)	(5, 0, 2, 30)	2156.36604	2191.35357	[-0.58381897]	[0.64558644 -0.10431524 -0.04229424]	3079.5164	Not Significant
(1, 0, 2)	(5, 0, 1, 30)	2156.38609	2185.99092	[-0.77818754]	[0.82351371 0.00469507]	2737.59941	Not Significant
(1, 0, 0)	(5, 0, 3, 30)	2156.447	2186.05182	[0.02192267]		2769.09098	Not Significant
(1, 0, 3)	(5, 0, 4, 30)	2156.61852	2196.98874	[-0.64112685]	[0.77416107 -0.08050341 -0.05648842]	3079.51529	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 4)	(5, 0, 3, 30)	2156.73132	2197.10154	[-0.58057715]	[0.69944285 -0.049211 -0.08799499 -0.08377687]	3289.16981	Not Significant
(1, 0, 3)	(5, 0, 1, 30)	2156.93126	2189.22744	[-0.83075161]	[0.87313417 -0.08358881 -0.10358755]	3079.51622	Not Significant
(1, 0, 2)	(5, 0, 0, 30)	2157.12747	2184.04095	[-0.90454776]	[0.95237158 0.07269689]	2737.59866	Not Significant
(1, 0, 0)	(3, 0, 5, 30)	2157.21818	2186.82301	[0.03287233]		2769.09074	Not Significant
(1, 0, 4)	(5, 0, 2, 30)	2157.63051	2195.30938	[-0.56771015]	[0.64720054 -0.05916459 -0.10112065 -0.09423464]	3289.17014	Not Significant
(1, 0, 0)	(5, 0, 4, 30)	2157.74694	2190.04312	[0.01828761]		2769.09014	Not Significant
(1, 0, 0)	(1, 0, 5, 30)	2157.98772	2182.20985	[0.04321024]		2769.09203	Not Significant
(1, 0, 0)	(5, 0, 0, 30)	2158.31086	2179.84165	[0.05587342]		2769.09177	Not Significant
(1, 0, 5)	(5, 0, 2, 30)	2158.33776	2198.70798	[-0.3900774]	[0.45885747 -0.04657595 -0.02809074 0.07353496 0.17955537]	4417.03264	Not Significant
(1, 0, 4)	(5, 0, 4, 30)	2158.4487	2201.51026	[-0.61643427]	[0.74911846 -0.05957308 -0.08348774 -0.05726073]	3289.16906	Not Significant
(1, 0, 4)	(5, 0, 1, 30)	2158.52217	2193.5097	[-0.76596811]	[0.82102123 -0.03421538 -0.14875044 -0.10462699]	3289.17013	Not Significant
(1, 0, 3)	(5, 0, 0, 30)	2158.71782	2188.32265	[-0.91901456]	[0.965824 -0.0041991 -0.08398115]	3079.51552	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 0)	(4, 0, 5, 30)	2158.72189	2191.01807	[0.02652243]		2769.08962	Not Significant
(2, 0, 0)	(3, 0, 5, 30)	2158.8182	2191.11438	[0.03437375 -0.07436014]		2813.45439	Not Significant
(1, 0, 0)	(2, 0, 5, 30)	2158.87988	2185.79336	[0.02850033]		2769.09168	Not Significant
(1, 0, 0)	(5, 0, 5, 30)	2159.10222	2194.08975	[0.00710479]		2769.08867	Not Significant
(1, 0, 5)	(5, 0, 3, 30)	2159.10468	2202.16625	[-0.45882813]	[0.56004996 -0.04162777 -0.03762287 0.0410764 0.15006174]	4417.03245	Not Significant
(2, 0, 0)	(1, 0, 5, 30)	2159.63278	2186.54626	[0.04420643 -0.06589164]		2813.45582	Not Significant
(3, 0, 0)	(3, 0, 5, 30)	2159.75806	2194.74558	[0.01854719 -0.06911652 -0.09114503]		2671.63192	Not Significant
(2, 0, 0)	(4, 0, 5, 30)	2160.35528	2195.3428	[0.02909908 -0.07210835]		2813.45327	Not Significant
(2, 0, 0)	(2, 0, 5, 30)	2160.545	2190.14982	[0.02918087 -0.06451339]		2813.45548	Not Significant
(3, 0, 0)	(1, 0, 5, 30)	2160.55606	2190.16089	[0.03054947 -0.05993894 -0.09686283]		2671.6331	Not Significant
(1, 0, 4)	(5, 0, 0, 30)	2160.98802	2193.28419	[-0.91583399]	[0.96995005 0.02848674 -0.10598461 -0.05335886]	3289.16907	Not Significant
(1, 0, 5)	(5, 0, 1, 30)	2161.07656	2198.75543	[-0.64657974]	[0.70833362 0.0064954 -0.10344629 -0.02517327 0.11044229]	4417.03253	Not Significant
(1, 0, 5)	(5, 0, 4, 30)	2161.109	2206.86191	[-0.46576026]	[0.56733708 -0.03961589 -0.03959924 0.03971492 0.14852975]	4417.03133	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 0)	(4, 0, 5, 30)	2161.12568	2198.80455	[0.01284219 -0.06385308 -0.10297595]		2671.63084	Not Significant
(3, 0, 0)	(2, 0, 5, 30)	2161.18204	2193.47821	[0.01016363 -0.05981637 -0.1143679]		2671.63274	Not Significant
(4, 0, 0)	(3, 0, 5, 30)	2161.48059	2199.15946	[0.03014409 -0.06625457 -0.09545589 0.0705989]		2757.29702	Not Significant
(5, 0, 0)	(3, 0, 5, 30)	2162.38263	2202.75285	[0.02691446 -0.05825245 -0.0889522 0.05571026 0.11841714]		2791.85786	Not Significant
(4, 0, 0)	(1, 0, 5, 30)	2162.40147	2194.69765	[0.03655253 -0.05882553 -0.10231495 0.04880624]		2757.29821	Not Significant
(4, 0, 0)	(4, 0, 5, 30)	2162.92187	2203.29208	[0.02331979 -0.06126009 -0.10695001 0.06588766]		2757.29592	Not Significant
(4, 0, 0)	(2, 0, 5, 30)	2162.99003	2197.97756	[0.01811565 -0.05829546 -0.11813298 0.05452517]		2757.29786	Not Significant
(5, 0, 0)	(1, 0, 5, 30)	2163.39381	2198.38133	[0.03197844 -0.05753704 -0.09555004 0.02993391 0.10550112]		2791.85901	Not Significant
(5, 0, 0)	(4, 0, 5, 30)	2163.83456	2206.89612	[0.01835704 -0.05289988 -0.10175814 0.05152919 0.11857769]		2791.85682	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 0)	(2, 0, 5, 30)	2163.99195	2201.67082	[0.01369892 -0.05375029 -0.11165439 0.03797218 0.10770783]		2791.85869	Not Significant
(1, 0, 5)	(5, 0, 0, 30)	2165.35315	2200.34067	[-0.55148917]	[0.65117938 0.09958729 -0.03553214 0.0937162 0.17167274]	4417.03281	Not Significant
(5, 0, 5)	(3, 0, 4, 30)	2645.2752	2700.33415	[-0.26370132 0.3279006 -0.68081133 -0.35347719 0.1628452]	[0.5571446 -0.45031497 0.76545143 0.80399398 -0.17408224]	4427.53254	Not Significant
(5, 0, 5)	(2, 0, 4, 30)	2645.34696	2697.50807	[-0.26251002 0.40929125 -0.75556803 -0.33344011 0.20349826]	[0.52683677 -0.50261103 0.82940983 0.77276036 -0.23845952]	4427.53219	Not Significant
(5, 0, 5)	(4, 0, 4, 30)	2647.21676	2705.17355	[-0.28073571 0.31851137 -0.70976511 -0.33885406 0.14169981]	[0.57819247 -0.44225177 0.78582866 0.80266715 -0.16556928]	4427.53259	Not Significant
(1, 0, 5)	(3, 0, 4, 30)	2651.37575	2694.84335	[-0.22886525]	[0.4557469 -0.02345262 0.16870679 0.15683525 0.15445021]	4417.03242	Not Significant
(3, 0, 5)	(3, 0, 4, 30)	2652.382	2701.64528	[-0.04431483 0.21699463 -0.56587424]	[0.236455 -0.30916248 0.63522452 0.25748824 0.02889976]	4305.39913	Not Significant
(2, 0, 5)	(3, 0, 4, 30)	2653.29939	2699.66482	[-0.22797689 -0.01637623]	[0.46132827 -0.01100627 0.16845572 0.14934769 0.15317693]	4316.31655	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 5)	(2, 0, 4, 30)	2654.7219	2698.1895	[0.91759635 -0.7904166]	[-0.81975114 0.75819704 0.11534653 0.10186776 0.06755903]	4316.31574	Not Significant
(2, 0, 5)	(1, 0, 4, 30)	2654.80683	2695.37659	[1.03200144 -0.79807238]	[-0.93217084 0.77550411 0.11701381 0.12334991 0.00144727]	4316.32065	Not Significant
(3, 0, 5)	(2, 0, 4, 30)	2655.02176	2701.3872	[0.04235942 0.13890335 -0.79645006]	[0.04296549 -0.12191119 0.8925876 0.19372128 0.09612843]	4305.39892	Not Significant
(3, 0, 5)	(4, 0, 4, 30)	2655.78796	2707.94908	[0.09385356 0.19232841 -0.7615209]	[0.0558942 -0.29136142 0.86378984 0.23652661 -0.0035887]	4305.39901	Not Significant
(4, 0, 5)	(2, 0, 4, 30)	2657.2965	2706.55978	[-0.00195374 -0.52403633 0.02570389 -0.72508791]	[0.08462596 0.54439742 0.06888495 0.95241397 0.11411865]	4224.65557	Not Significant
(5, 0, 5)	(1, 0, 4, 30)	2657.49213	2706.75541	[-0.19149615 0.63182472 -0.86578514 -0.40047358 0.37800253]	[0.46468484 -0.59279304 0.84210883 0.77961177 -0.26274754]	4427.53296	Not Significant
(3, 0, 5)	(1, 0, 4, 30)	2658.37862	2701.84622	[0.48156605 0.56142969 -0.72189752]	[-0.29510663 -0.66253575 0.73988185 0.2482349 -0.11175379]	4305.39975	Not Significant
(4, 0, 5)	(3, 0, 4, 30)	2659.55116	2711.71227	[-0.29315463 -0.31441669 -0.11225914 -0.77631943]	[0.40369521 0.39520166 0.2525138 0.97448499 0.27300207]	4224.65557	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 5)	(4, 0, 4, 30)	2661.811	2716.86995	[-0.14368278 -0.32625219 -0.1297893 -0.88322298]	[0.27320606 0.34270818 0.20119723 0.97243846 0.17379234]	4224.65564	Not Significant
(1, 0, 5)	(2, 0, 4, 30)	2662.18981	2702.75957	[0.18458196]	[0.09633556 0.05267583 0.20380699 0.217321 0.2398722]	4417.03324	Not Significant
(4, 0, 5)	(1, 0, 4, 30)	2662.3356	2708.70103	[0.17839919 0.3236758 0.27705177 -0.85594457]	[0.07362622 -0.29190246 -0.33729912 0.83463715 0.23761071]	4224.65578	Not Significant
(1, 0, 5)	(1, 0, 4, 30)	2662.88054	2700.55246	[0.33204969]	[-0.11263164 0.02242378 0.08485578 0.10219548 0.1074801]	4417.03296	Not Significant
(2, 0, 4)	(4, 0, 4, 30)	2663.30367	2709.78807	[-0.83506876 0.06547933]	[1.28763246 0.07196913 0.0214534 0.32081535]	3255.97893	Not Significant
(4, 0, 4)	(2, 0, 4, 30)	2664.32495	2710.80934	[-0.4250714 0.37486959 -0.6617156 -0.55652358]	[0.66565395 -0.44879127 0.71668364 0.95829056]	3465.47658	Not Significant
(4, 0, 4)	(3, 0, 4, 30)	2664.54503	2713.9347	[-0.48107555 0.19333944 -0.64530344 -0.50317987]	[0.71667321 -0.30049557 0.76967631 0.95205183]	3465.47674	Not Significant
(5, 0, 5)	(4, 0, 3, 30)	2665.12101	2720.32123	[-0.25948628 0.37072499 -0.69483884 -0.33994183 0.21680351]	[0.51725825 -0.47746163 0.7955098 0.78591634 -0.2221936]	4427.53254	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 5)	(4, 0, 4, 30)	2665.29723	2711.66267	[0.08212049]	[0.12362562 0.04479396 0.04222963 0.05164941 0.09076929]	4417.03251	Not Significant
(2, 0, 5)	(4, 0, 4, 30)	2665.56104	2714.82432	[0.07575995 -0.59931524]	[0.13101977 0.63199207 0.11990425 0.01995898 0.11150433]	4316.31655	Not Significant
(5, 0, 4)	(4, 0, 3, 30)	2667.9467	2720.24164	[-0.12727609 0.70371791 -0.23225348 -0.6282419 0.14687142]	[0.41424801 -0.74036199 0.26669071 0.91332662]	3733.71364	Not Significant
(5, 0, 4)	(3, 0, 4, 30)	2668.05988	2720.35483	[-0.12678146 0.69959866 -0.23517754 -0.62351359 0.15126136]	[0.41921385 -0.7375815 0.26081837 0.90628163]	3733.71365	Not Significant
(2, 0, 4)	(3, 0, 4, 30)	2668.53886	2712.11798	[-0.57121518 0.33561739]	[0.93826752 -0.3434969 0.01448869 0.38425472]	3255.98001	Not Significant
(1, 0, 4)	(3, 0, 4, 30)	2668.78221	2709.45606	[-0.37901993]	[0.63188101 -0.01559023 0.10990515 0.04584011]	3289.16971	Not Significant
(5, 0, 4)	(4, 0, 4, 30)	2669.63434	2724.83456	[-0.10894953 0.70652227 -0.24996566 -0.63897288 0.15835331]	[0.39515107 -0.7499673 0.29330256 0.94099385]	3733.71362	Not Significant
(5, 0, 5)	(4, 0, 1, 30)	2669.67961	2719.06928	[-0.10359254 0.37146361 -0.5178207 -0.42355572 0.43052432]	[0.32336604 -0.42884005 0.70076154 0.75686976 -0.33452825]	4427.53266	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 4)	(4, 0, 1, 30)	2670.09932	2716.58371	[-0.39818393 0.2387254 -0.45280237 -0.56903235 0.20919701]	[0.66682864 -0.23676128 0.58137726 0.95286942]	3733.71485	Not Significant
(2, 0, 4)	(2, 0, 4, 30)	2670.10791	2710.78175	[-1.44927924 -0.49134805]	[1.79062567 0.84759086 0.14058833 0.14075557]	3255.97941	Not Significant
(5, 0, 5)	(4, 0, 0, 30)	2670.8112	2717.29559	[-0.29817926 0.48922688 -0.81448922 -0.46224755 0.2307589]	[0.56862465 -0.51520483 0.80044841 0.86442179 -0.16596241]	4427.53207	Not Significant
(1, 0, 4)	(2, 0, 4, 30)	2670.90018	2708.66875	[-0.95162649]	[1.32973933 0.13594563 0.03523796 0.30746645]	3289.1513	Not Significant
(5, 0, 5)	(4, 0, 2, 30)	2671.68031	2723.97526	[-0.12166699 0.36500214 -0.51594864 -0.43254891 0.41541555]	[0.33428657 -0.42215002 0.69502639 0.76080064 -0.31998009]	4427.53263	Not Significant
(3, 0, 4)	(2, 0, 4, 30)	2671.73209	2715.31121	[0.08720932 0.12446815 -0.75997019]	[-0.01464437 -0.14993609 0.83450901 0.21882041]	3278.53485	Not Significant
(5, 0, 4)	(4, 0, 2, 30)	2671.80955	2721.19923	[-0.37105999 0.2474637 -0.45596804 -0.54459889 0.23507575]	[0.64893666 -0.24488933 0.6096687 0.97641563]	3733.71422	Not Significant
(5, 0, 3)	(4, 0, 1, 30)	2672.09997	2715.67909	[0.3115185 0.12527442 -0.80380741 0.2144988 0.02359132]	[-0.24776085 -0.11780191 0.91003668]	3759.74192	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 3)	(4, 0, 2, 30)	2672.51251	2718.9969	[0.31142793 0.09566486 -0.81706108 0.21326852 0.00205882]	[-0.24181936 -0.10607149 0.89706585]	3759.7411	Not Significant
(5, 0, 1)	(4, 0, 3, 30)	2672.85646	2716.43558	[-0.42727782 0.01654496 0.04678811 -0.03559543 0.06106206]	[0.70004027]	2791.85797	Not Significant
(3, 0, 4)	(3, 0, 4, 30)	2673.19423	2719.67863	[0.08297308 0.15174163 -0.76118668]	[0.02310242 -0.231022 0.87274108 0.19255561]	3278.53484	Not Significant
(5, 0, 3)	(4, 0, 3, 30)	2674.50656	2723.89623	[0.30598786 0.09933178 -0.81695444 0.21112486 0.0067637]	[-0.23861259 -0.11209024 0.90051402]	3759.74109	Not Significant
(5, 0, 4)	(4, 0, 0, 30)	2674.94348	2718.5226	[-0.26431456 0.54442821 -0.20786711 -0.55549787 0.19078711]	[0.59820408 -0.4932784 0.22929387 0.79485848]	3733.71499	Not Significant
(2, 0, 4)	(1, 0, 4, 30)	2675.46588	2713.23445	[-1.61766459 -0.64617133]	[1.90790745 1.0511609 0.21074403 0.11750895]	3255.9804	Not Significant
(5, 0, 4)	(1, 0, 4, 30)	2675.67862	2722.16302	[0.16886148 1.08501587 -0.20727534 -0.83416736 0.12856014]	[0.14153822 -1.1983102 0.02705139 0.93613799]	3733.71503	Not Significant
(4, 0, 4)	(4, 0, 4, 30)	2676.55665	2728.8516	[0.47454224 0.10886904 -0.91844523 0.33121306]	[-0.40336555 -0.09722341 0.99225956 -0.22066903]	3465.47639	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 4)	(2, 0, 4, 30)	2676.66652	2726.0562	[-0.1283873 0.68714519 -0.34062852 -0.7440616 0.11227884]	[0.39328518 -0.73687001 0.31698695 0.95552809]	3733.71442	Not Significant
(5, 0, 3)	(4, 0, 4, 30)	2676.93138	2729.22633	[0.35064898 0.10944248 -0.89579246 0.16413421 -0.04054078]	[-0.27231703 -0.13946294 0.92297335]	3759.74091	Not Significant
(3, 0, 4)	(4, 0, 4, 30)	2677.30608	2726.69575	[0.19171754 0.19015209 -0.88929422]	[-0.162922 -0.22065384 0.95812088 0.0645735]	3278.53437	Not Significant
(5, 0, 0)	(4, 0, 0, 30)	2678.71405	2710.67207	[0.19388192 -0.02128231 0.00899374 0.01443102 0.02324679]		2791.85888	Not Significant
(5, 0, 1)	(4, 0, 0, 30)	2679.50054	2714.36384	[-0.11185892 0.0505856 0.02063646 0.02616123 0.06238343]	[0.31356361]	2791.85881	Not Significant
(5, 0, 3)	(4, 0, 0, 30)	2679.53756	2720.21141	[0.40073282 0.14502392 -0.90256892 0.22264804 0.02158361]	[-0.24587457 -0.17927868 0.95998191]	3759.73924	Not Significant
(5, 0, 2)	(4, 0, 3, 30)	2679.60837	2726.09276	[-0.07641373 -0.84468323 0.22412293 -0.04878847 0.10490766]	[0.30918558 0.9697339]	2909.9282	Not Significant
(3, 0, 4)	(1, 0, 4, 30)	2679.68065	2720.3545	[0.55595536 0.48219353 -0.65151606]	[-0.35975657 -0.48974164 0.62706604 0.18008642]	3278.5426	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 0)	(4, 0, 1, 30)	2679.70702	2714.57032	[0.20449145 -0.00635178 0.02514703 0.020962 0.04821015]		2791.8586	Not Significant
(5, 0, 2)	(4, 0, 1, 30)	2679.94225	2720.6161	[-0.14701671 -0.88300076 0.20525207 -0.0278005 0.06879662]	[0.35557541 0.98404282]	2909.92869	Not Significant
(5, 0, 0)	(4, 0, 3, 30)	2680.04611	2720.71996	[0.17797544 -0.03795431 0.04915097 -0.00329826 0.05808199]		2791.85694	Not Significant
(5, 0, 0)	(4, 0, 2, 30)	2680.13684	2717.90541	[0.23960848 0.00742871 0.05097606 0.00960236 0.07129759]		2791.85877	Not Significant
(5, 0, 2)	(4, 0, 0, 30)	2680.45401	2718.22258	[0.08099866 -0.55837904 0.15013203 0.03071068 0.11614663]	[0.12581346 0.58527679]	2909.92926	Not Significant
(5, 0, 0)	(4, 0, 4, 30)	2680.48131	2724.06043	[0.18158136 -0.04503226 0.00227173 -0.0473576 0.04470097]		2791.85815	Not Significant
(1, 0, 4)	(1, 0, 4, 30)	2681.19314	2716.05643	[0.48291878]	[-0.27376389 -0.03407787 0.0664311 0.07754124]	3289.1705	Not Significant
(5, 0, 1)	(4, 0, 1, 30)	2681.49593	2719.2645	[-0.07950288 0.04532532 0.02193142 0.02550473 0.06361316]	[0.28201274]	2791.85883	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 4)	(4, 0, 4, 30)	2681.77273	2725.35186	[0.02934515]	[0.16146369 0.0165208 0.00712896 -0.00526333]	3289.17012	Not Significant
(4, 0, 4)	(4, 0, 3, 30)	2681.83039	2731.34552	[-0.38639136 0.34027108 -0.60983994 -0.58439763]	[0.63381325 -0.43992118 0.68908921 0.95235089]	3465.47675	Not Significant
(4, 0, 4)	(1, 0, 4, 30)	2681.83215	2725.41127	[0.31514088 0.10328856 -0.86898994 0.10812473]	[-0.13700158 -0.15169292 0.86727749 0.15777295]	3465.47766	Not Significant
(5, 0, 2)	(4, 0, 2, 30)	2681.95173	2725.53085	[-0.1430453 -0.87540789 0.20073254 -0.02642611 0.06549287]	[0.34937978 0.96781149]	2909.92806	Not Significant
(5, 0, 2)	(4, 0, 4, 30)	2682.38045	2731.77012	[0.31203647 -0.4234074 0.06309112 -0.04959059 0.07450481]	[-0.12810765 0.38016806]	2909.92787	Not Significant
(5, 0, 1)	(4, 0, 4, 30)	2682.50402	2728.98842	[0.15724157 -0.04046687 0.00172531 -0.04709959 0.04635317]	[0.02581272]	2791.85805	Not Significant
(5, 0, 1)	(4, 0, 2, 30)	2683.09953	2723.77338	[-0.18335742 0.0566219 0.01468527 0.01940658 0.06103347]	[0.38160709]	2791.85834	Not Significant
(4, 0, 4)	(4, 0, 2, 30)	2685.21121	2731.81369	[-0.44633147 0.32311706 -0.640613 -0.52288564]	[0.65429031 -0.39489371 0.7439614 0.92372089]	3465.47679	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 3)	(3, 0, 4, 30)	2685.7667	2723.63121	[-0.3766402]	[6.33166955e-01 4.39661475e-04 8.15090645e-02]	3079.51637	Not Significant
(4, 0, 4)	(4, 0, 1, 30)	2685.98979	2729.67961	[-0.46128014 0.34841878 -0.59864033 -0.5252629]	[0.64520675 -0.39299072 0.74582666 0.91771274]	3465.47707	Not Significant
(2, 0, 3)	(3, 0, 4, 30)	2687.72282	2728.49999	[-0.41081061 -0.0453222]	[0.66486285 0.04830731 0.09146941]	3071.92479	Not Significant
(4, 0, 3)	(4, 0, 1, 30)	2688.76595	2729.54311	[0.33904192 0.09587637 -0.79179285 0.22731048]	[-0.26708487 -0.10221323 0.89239708]	3731.46168	Not Significant
(4, 0, 3)	(4, 0, 2, 30)	2689.10295	2732.79277	[0.31532469 0.09683422 -0.81563542 0.2144546]	[-0.24620018 -0.10434925 0.89693714]	3731.46036	Not Significant
(4, 0, 3)	(2, 0, 4, 30)	2689.68199	2733.37182	[0.32161308 0.09595324 -0.82086865 0.22308872]	[-0.23835878 -0.10849127 0.89927772]	3731.46038	Not Significant
(4, 0, 1)	(4, 0, 3, 30)	2689.78686	2730.56403	[-0.45970304 0.02473539 0.04690373 -0.05389634]	[0.72799744]	2757.29672	Not Significant
(4, 0, 2)	(4, 0, 4, 30)	2690.43424	2737.03672	[1.11744375 -0.95360683 0.07756148 - 0.00167283]	[-1.13536396 0.96823667]	2909.92669	Not Significant
(4, 0, 3)	(4, 0, 3, 30)	2691.11731	2737.71979	[0.30124403 0.10427988 -0.81703252 0.2105671]	[-0.2315656 -0.12175654 0.90704516]	3731.46056	Not Significant
(4, 0, 2)	(4, 0, 1, 30)	2691.26577	2729.13029	[1.22127293 -0.98562242 0.12279098 0.07382548]	[-1.15362141 0.946321]	2909.92747	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 3)	(3, 0, 4, 30)	2691.54703	2738.14951	[0.3112563 0.10066416 -0.80684688 0.21607176]	[-0.22439785 -0.12839358 0.88604305]	3731.46059	Not Significant
(5, 0, 3)	(2, 0, 4, 30)	2691.71911	2738.32159	[0.317262 0.10146628 -0.82305268 0.22264357 0.00278222]	[-0.23298547 -0.11341078 0.90169996]	3759.74103	Not Significant
(2, 0, 3)	(1, 0, 4, 30)	2692.72716	2727.67902	[1.23000476 -0.69282376]	[-1.08154121 0.5374515 0.19317808]	3071.92616	Not Significant
(4, 0, 2)	(4, 0, 2, 30)	2692.83937	2733.61654	[1.13861395 -0.95351051 0.09084456 0.07422778]	[-1.07902074 0.89917118]	2909.92739	Not Significant
(4, 0, 2)	(4, 0, 3, 30)	2693.43829	2737.12812	[1.14420344 -0.94004061 0.05929122 0.07567488]	[-1.12596466 0.9440039]	2909.92771	Not Significant
(5, 0, 3)	(3, 0, 4, 30)	2693.50151	2743.01664	[0.31562108 0.09794943 -0.81266704 0.21740496 0.00592989]	[-0.23289137 -0.11654531 0.89356032]	3759.74093	Not Significant
(4, 0, 3)	(4, 0, 4, 30)	2693.78113	2743.29626	[0.33709927 0.15923878 -0.90857456 0.14261868]	[-0.25788553 -0.16030413 0.94065412]	3731.46047	Not Significant
(4, 0, 3)	(1, 0, 4, 30)	2694.44755	2735.22472	[0.50848603 0.08948143 -0.77746083 0.34622841]	[-0.30177694 -0.08474009 0.86641695]	3731.46563	Not Significant
(4, 0, 0)	(4, 0, 0, 30)	2695.39278	2724.51932	[0.19510233 -0.0180899 0.01017612 0.02311374]		2757.29804	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 3)	(1, 0, 4, 30)	2695.74547	2739.43529	[0.45357139 0.15241293 -0.79715444 0.3139199 0.07957291]	[-0.2717951 -0.09624059 0.8896399]	3759.74468	Not Significant
(4, 0, 3)	(4, 0, 0, 30)	2696.11243	2733.97694	[0.4120477 0.12211234 -0.89692511 0.23488194]	[-0.25205296 -0.17285235 0.95217201]	3731.45849	Not Significant
(4, 0, 0)	(4, 0, 1, 30)	2696.66642	2728.70563	[0.20264134 -0.00534733 0.0206518 0.03394418]		2757.29782	Not Significant
(4, 0, 1)	(4, 0, 0, 30)	2696.67579	2728.71499	[-0.07118067 0.04419373 0.01991964 0.02357438]	[0.26941842]	2757.29796	Not Significant
(4, 0, 5)	(4, 0, 3, 30)	2697.03209	2749.45988	[-0.01196193 -0.50383163 0.0117644 -0.70164619]	[0.07574763 0.53128449 0.05661663 0.93603462 0.09332389]	4224.65552	Not Significant
(4, 0, 0)	(4, 0, 3, 30)	2697.0434	2734.90791	[0.17607927 -0.03300474 0.04797529 0.01242377]		2757.2964	Not Significant
(1, 0, 3)	(2, 0, 4, 30)	2697.04944	2732.0013	[-0.92684098]	[1.1403349 0.14945411 -0.0658497]	3079.51479	Not Significant
(2, 0, 3)	(4, 0, 4, 30)	2697.29742	2740.98724	[0.62233391 -0.55032077]	[-0.46396451 0.45324774 0.06957078]	3071.92371	Not Significant
(4, 0, 2)	(4, 0, 0, 30)	2697.33145	2732.28331	[0.50995489 -1.00941654 0.24314186 0.00116733]	[-0.28943714 0.95034137]	2909.93802	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 5)	(4, 0, 0, 30)	2697.36405	2741.05387	[-0.24917722 -0.21015399 -0.05017762 -0.80758881]	[0.44126555 0.26197283 0.14348283 0.94799 0.26853592]	4224.65569	Not Significant
(4, 0, 0)	(4, 0, 4, 30)	2697.3726	2738.14976	[0.18053875 -0.04188784 0.00038105 -0.03524615]		2757.29736	Not Significant
(3, 0, 3)	(1, 0, 4, 30)	2697.44181	2735.30633	[0.5545649 -0.83718961 0.65928054]	[-0.35096794 0.86161569 -0.5614368]	3226.02767	Not Significant
(4, 0, 0)	(4, 0, 2, 30)	2697.50499	2732.45685	[0.23784023 0.01561008 0.04560819 0.03349273]		2757.2988	Not Significant
(4, 0, 4)	(4, 0, 0, 30)	2697.74328	2738.52045	[0.18392909 0.15607853 -0.82503573 0.00156841]	[-0.02941043 -0.19632115 0.84311024 0.25782515]	3465.47712	Not Significant
(1, 0, 3)	(4, 0, 4, 30)	2697.89205	2738.66921	[0.07306281]	[0.11588405 0.00840375 0.0107954]	3079.51629	Not Significant
(1, 0, 3)	(1, 0, 4, 30)	2698.0207	2730.05991	[0.49871965]	[-0.28302729 -0.04943391 0.04923892]	3079.51662	Not Significant
(4, 0, 1)	(4, 0, 1, 30)	2698.11169	2733.06355	[-0.65167871 0.15075056 0.00112556 0.06092179]	[0.84679308]	2757.29331	Not Significant
(4, 0, 5)	(4, 0, 1, 30)	2698.30991	2744.91239	[-0.26640105 -0.29819224 -0.17454265 -0.8823182]	[0.43851999 0.32665455 0.23382411 0.98989641 0.23554022]	4224.6557	Not Significant
(4, 0, 1)	(4, 0, 2, 30)	2698.91428	2736.7788	[-0.67239624 0.14439435 -0.00947866 0.04725533]	[0.87191575]	2757.29674	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 1)	(4, 0, 4, 30)	2699.4076	2743.09742	[0.18931643 -0.04344444 0.00054111 -0.0349311]	[-0.00923144]	2757.29715	Not Significant
(4, 0, 5)	(4, 0, 2, 30)	2699.49436	2749.00949	[0.05466374 0.12956138 0.20154905 -0.8145222]	[0.12406778 -0.07682171 -0.19563911 0.86500655 0.23619891]	4224.65545	Not Significant
(3, 0, 3)	(4, 0, 4, 30)	2699.51978	2746.12226	[0.69685533 -0.35857636 -0.20114668]	[-0.56180737 0.21490945 0.3240965]	3226.02642	Not Significant
(2, 0, 3)	(2, 0, 4, 30)	2699.59374	2737.45825	[-0.69789709 0.14669708]	[0.88878083 -0.01430197 -0.04544271]	3071.92334	Not Significant
(3, 0, 3)	(3, 0, 4, 30)	2700.87928	2744.56911	[0.10444564 -0.90231962 0.23164117]	[0.08342961 0.95107116 -0.12152405]	3226.02668	Not Significant
(3, 0, 3)	(2, 0, 4, 30)	2701.11429	2741.89145	[0.2642866 -0.85234237 0.36315044]	[-0.06905157 0.87925889 -0.2578365]	3226.02691	Not Significant
(1, 0, 2)	(3, 0, 4, 30)	2704.57148	2739.61125	[-0.47062864]	[0.73843415 -0.01230929]	2737.59935	Not Significant
(2, 0, 2)	(3, 0, 4, 30)	2706.49636	2744.45611	[-0.41810268 0.05106061]	[0.69172034 -0.06002591]	2761.90006	Not Significant
(3, 0, 1)	(4, 0, 3, 30)	2706.71399	2744.67374	[-0.4712482 0.03408872 0.07447161]	[0.74414475]	2671.63176	Not Significant
(3, 0, 2)	(2, 0, 4, 30)	2708.84442	2746.80418	[1.27535606 -1.10844718 0.24159587]	[-1.17192053 0.97223223]	2886.11335	Not Significant
(3, 0, 4)	(4, 0, 2, 30)	2708.93772	2752.73744	[0.07902619 0.14556251 -0.75416945]	[0.00704684 -0.17332989 0.83343091 0.23152125]	3278.53482	Not Significant
(3, 0, 2)	(1, 0, 4, 30)	2709.13735	2744.17712	[1.37271424 -1.17920636 0.30739073]	[-1.19976802 0.98184772]	2886.11725	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	(4, 0, 3, 30)	2709.7558	2759.39548	[-0.09762151 0.11077099 -0.48793542]	[0.29165168 -0.15318922 0.574653 0.21205654 0.13994166]	4305.39882	Not Significant
(4, 0, 2)	(1, 0, 4, 30)	2710.40185	2748.3616	[1.31986343 -1.07177817 0.18839707 0.08116352]	[-1.1811795 0.97231181]	2909.92939	Not Significant
(3, 0, 4)	(4, 0, 3, 30)	2710.54568	2757.26537	[0.10140213 0.14348131 -0.7336915]	[-0.0216517 -0.17288146 0.82222659 0.21566822]	3278.53482	Not Significant
(4, 0, 2)	(2, 0, 4, 30)	2710.56646	2751.4462	[1.23219057 -1.03987755 0.16176693 0.04675077]	[-1.15875237 0.96517027]	2909.92585	Not Significant
(3, 0, 5)	(4, 0, 2, 30)	2710.81724	2757.53694	[0.03922874 0.11837682 -0.78746656]	[0.0417739 -0.092491 0.89552755 0.17965177 0.13139442]	4305.39908	Not Significant
(3, 0, 0)	(4, 0, 0, 30)	2712.03165	2738.31148	[0.19724786 -0.01456387 0.01946709]		2671.63292	Not Significant
(3, 0, 4)	(4, 0, 1, 30)	2712.42578	2753.30551	[0.49857289 0.49153022 -0.73769182]	[-0.33432412 -0.5326052 0.74448666 0.20908735]	3278.53582	Not Significant
(4, 0, 2)	(3, 0, 4, 30)	2712.65599	2756.4557	[1.21200764 -1.0067547 0.13820932 0.05632796]	[-1.14496908 0.94963712]	2909.92758	Not Significant
(3, 0, 1)	(4, 0, 0, 30)	2713.45957	2742.65938	[-0.05265666 0.04298265 0.0214941]	[0.25057834]	2671.63285	Not Significant
(3, 0, 0)	(4, 0, 1, 30)	2713.51544	2742.71525	[0.20208193 -0.00519578 0.02907114]		2671.63271	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	(4, 0, 1, 30)	2713.57914	2757.37885	[0.43313252 0.55691044 -0.77137548]	[-0.2601899 -0.61391222 0.81924025 0.19770858 0.00638123]	4305.39911	Not Significant
(3, 0, 0)	(4, 0, 3, 30)	2713.7067	2748.74647	[0.17636502 -0.03170396 0.05061213]		2671.63121	Not Significant
(3, 0, 3)	(4, 0, 0, 30)	2713.85794	2748.89771	[0.123722 -0.77756108 0.36938781]	[0.0627552 0.90666869 -0.26847545]	3226.025	Not Significant
(2, 0, 2)	(4, 0, 4, 30)	2714.12018	2754.99991	[0.51429153 -0.42009235]	[-0.36535079 0.36780737]	2761.89943	Not Significant
(1, 0, 2)	(4, 0, 4, 30)	2714.15191	2752.11166	[0.12788202]	[0.05894353 0.00228479]	2737.59937	Not Significant
(1, 0, 2)	(2, 0, 4, 30)	2714.20271	2746.3225	[-0.87886002]	[1.07530114 0.18784945]	2737.59817	Not Significant
(3, 0, 0)	(4, 0, 4, 30)	2714.20446	2752.16421	[0.1866484 -0.03370018 -0.00324457]		2671.63227	Not Significant
(1, 0, 2)	(1, 0, 4, 30)	2714.29499	2743.49479	[0.52362164]	[-0.30319187 -0.04336907]	2737.59975	Not Significant
(3, 0, 4)	(4, 0, 0, 30)	2714.54105	2752.5008	[0.18487527 0.14889319 -0.82204325]	[-0.02374499 -0.19720365 0.84654472 0.26082381]	3278.53524	Not Significant
(3, 0, 2)	(3, 0, 4, 30)	2714.86017	2755.73991	[-0.6258567 -0.68389108 0.20861924]	[0.82727108 0.88997107]	2886.11628	Not Significant
(3, 0, 2)	(4, 0, 3, 30)	2714.87391	2755.75364	[-0.62284976 -0.67713692 0.2059348]	[0.82331912 0.87878739]	2886.11644	Not Significant
(3, 0, 3)	(4, 0, 2, 30)	2715.13799	2756.01772	[0.46773431 -0.73134362 0.57481114]	[-0.28186098 0.82984093 -0.55826872]	3226.02688	Not Significant
(3, 0, 2)	(4, 0, 0, 30)	2715.2257	2747.34549	[0.47826003 -0.75789381 0.14796089]	[-0.27449558 0.66724513]	2886.11711	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 0)	(4, 0, 2, 30)	2715.26709	2747.38688	[0.19732826 -0.00897115 0.02313412]		2671.63255	Not Significant
(3, 0, 2)	(4, 0, 1, 30)	2715.33072	2750.37049	[0.48383662 -1.01543411 0.22748789]	[-0.28977088 0.98342444]	2886.11593	Not Significant
(3, 0, 1)	(4, 0, 1, 30)	2715.39609	2747.51588	[-0.29011307 0.08536906 0.01380324]	[0.48420784]	2671.63251	Not Significant
(3, 0, 3)	(4, 0, 1, 30)	2715.63251	2753.59226	[0.45614353 -0.85430616 0.56854927]	[-0.25556319 0.88665538 -0.46632357]	3226.02708	Not Significant
(2, 0, 2)	(1, 0, 4, 30)	2715.97596	2748.09575	[-0.39828962 0.03504597]	[0.59388986 0.06572508]	2761.89971	Not Significant
(3, 0, 2)	(4, 0, 4, 30)	2716.01956	2759.81928	[0.63391102 -0.54094508 0.05567127]	[-0.47287373 0.45243312]	2886.1153	Not Significant
(3, 0, 1)	(4, 0, 2, 30)	2716.03127	2751.07104	[-0.66677941 0.14695113 -0.03720129]	[0.86012954]	2671.6318	Not Significant
(2, 0, 2)	(2, 0, 4, 30)	2716.14389	2751.18366	[-1.22783838 -0.29991283]	[1.39748643 0.47410062]	2761.89814	Not Significant
(3, 0, 1)	(4, 0, 4, 30)	2716.23299	2757.11272	[0.20834536 -0.0375591 -0.00350104]	[-0.02285628]	2671.63194	Not Significant
(3, 0, 5)	(4, 0, 0, 30)	2716.65998	2757.53972	[0.14011739 0.16673993 -0.852779]	[0.01763071 -0.14695771 0.90365537 0.20958889 0.12090024]	4305.39837	Not Significant
(3, 0, 2)	(4, 0, 2, 30)	2717.1789	2755.13865	[0.49350067 -1.02516429 0.2322293]	[-0.28115982 0.95648551]	2886.1152	Not Significant
(5, 0, 2)	(3, 0, 4, 30)	2717.91232	2764.63202	[-0.13177636 -0.8151932 0.17159302 0.00349481 0.0969799]	[0.30197768 0.96821398]	2909.92812	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 3)	(4, 0, 3, 30)	2719.48375	2763.28347	[0.16631038 -0.88338596 0.29601781]	[0.02595499 0.93543593 -0.1855075]	3226.02682	Not Significant
(5, 0, 2)	(1, 0, 4, 30)	2719.83858	2760.71832	[0.00243305 -0.70111133 0.17900872 0.01461225 0.11090274]	[0.20425074 0.74193831]	2909.92865	Not Significant
(5, 0, 2)	(2, 0, 4, 30)	2720.91499	2764.7147	[-0.05212522 -0.81142163 0.19397118 0.00121946 0.09884115]	[0.25236289 0.86908396]	2909.92822	Not Significant
(1, 0, 1)	(3, 0, 4, 30)	2722.78216	2754.98195	[-0.48036962]	[0.75589137]	2716.50136	Not Significant
(2, 0, 1)	(4, 0, 3, 30)	2724.54103	2759.66807	[-0.47978272 0.02022998]	[0.76516307]	2671.63179	Not Significant
(2, 0, 1)	(3, 0, 4, 30)	2724.72852	2759.85557	[-0.4778734 0.02044736]	[0.76321919]	2671.63191	Not Significant
(2, 0, 3)	(4, 0, 3, 30)	2725.45944	2766.44099	[-0.48547878 -0.07692694]	[0.76151906 0.12581268 0.09822789]	3071.92478	Not Significant
(2, 0, 2)	(4, 0, 3, 30)	2725.56674	2763.62104	[-0.44996044 0.04056111]	[0.73470845 -0.02847479]	2761.89984	Not Significant
(2, 0, 4)	(4, 0, 3, 30)	2725.69819	2769.60699	[-0.54175266 0.33703881]	[0.9022567 -0.34203222 0.07229977 0.41230172]	3255.97995	Not Significant
(3, 0, 1)	(3, 0, 4, 30)	2726.24087	2764.29517	[-0.46098717 0.04384016 0.07097239]	[0.74202079]	2671.63168	Not Significant
(2, 0, 4)	(4, 0, 2, 30)	2726.58188	2767.56343	[-1.48500316 -0.53066801]	[1.82476747 0.92487219 0.1819362 0.14150291]	3255.97971	Not Significant
(4, 0, 1)	(3, 0, 4, 30)	2728.0639	2769.04545	[-0.44644287 0.03788164 0.04784197 -0.05433691]	[0.72333798]	2757.29682	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 5)	(4, 0, 3, 30)	2729.3779	2776.21395	[-0.56086644 0.08837384]	[0.86216331 -0.06151 0.06959663 0.05358877 -0.11448169]	4316.31648	Not Significant
(2, 0, 0)	(4, 0, 0, 30)	2729.61691	2753.03494	[0.20210216 -0.01236831]		2813.45568	Not Significant
(2, 0, 5)	(4, 0, 1, 30)	2729.79903	2770.78058	[0.9115072 -0.77886286]	[-0.810209 0.7757568 0.09003413 0.14685863 0.05993966]	4316.3164	Not Significant
(5, 0, 1)	(3, 0, 4, 30)	2730.01477	2773.92358	[-0.42660326 0.03446514 0.04758617 -0.04182429 0.03846922]	[0.70644815]	2791.85775	Not Significant
(2, 0, 1)	(4, 0, 0, 30)	2730.56834	2756.91362	[-0.06657574 0.04986589]	[0.27041795]	2671.63262	Not Significant
(2, 0, 0)	(4, 0, 1, 30)	2730.72246	2757.06774	[0.2063293 0.00330531]		2813.45544	Not Significant
(2, 0, 4)	(4, 0, 1, 30)	2731.30866	2769.36295	[-1.47290013 -0.50572327]	[1.7449377 0.80646914 0.16393093 0.15898532]	3255.98193	Not Significant
(2, 0, 0)	(4, 0, 3, 30)	2731.48609	2763.68588	[0.1797719 -0.01863648]		2813.45388	Not Significant
(1, 0, 1)	(1, 0, 4, 30)	2731.48999	2757.83527	[0.08786925]	[0.12644277]	2716.50217	Not Significant
(2, 0, 0)	(4, 0, 2, 30)	2731.76283	2761.03536	[0.23558051 0.02705367]		2813.45634	Not Significant
(1, 0, 1)	(4, 0, 4, 30)	2731.79858	2766.92562	[0.13155109]	[0.06608768]	2716.50199	Not Significant
(2, 0, 0)	(4, 0, 4, 30)	2732.00874	2767.13578	[0.1976806 -0.03096023]		2813.455	Not Significant
(2, 0, 1)	(4, 0, 1, 30)	2732.46448	2761.73701	[-0.35916507 0.10357014]	[0.55973994]	2671.6322	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 2)	(4, 0, 0, 30)	2732.50273	2761.77526	[-0.16157298 0.13372334]	[0.36680309 -0.06272855]	2761.90056	Not Significant
(2, 0, 1)	(4, 0, 2, 30)	2732.54409	2764.74388	[0.4979005 -0.03941161]	[-0.27623624]	2671.63283	Not Significant
(1, 0, 1)	(2, 0, 4, 30)	2732.9146	2762.18714	[0.02068121]	[0.1830301]	2716.50207	Not Significant
(2, 0, 1)	(1, 0, 4, 30)	2733.43125	2762.70379	[0.58949405 -0.05218962]	[-0.36639612]	2671.63282	Not Significant
(2, 0, 1)	(2, 0, 4, 30)	2733.5508	2765.75059	[-0.66455581 0.18273397]	[0.86059127]	2671.63131	Not Significant
(2, 0, 1)	(4, 0, 4, 30)	2733.64098	2771.69528	[0.18471632 -0.02872774]	[0.01319801]	2671.63203	Not Significant
(2, 0, 2)	(4, 0, 1, 30)	2734.44375	2766.64354	[-0.42202922 0.07919066]	[0.62190534 0.0336196]	2761.89993	Not Significant
(3, 0, 1)	(1, 0, 4, 30)	2734.98276	2767.18255	[-0.33018922 0.10794512 0.01248637]	[0.53611502]	2671.63231	Not Significant
(2, 0, 3)	(4, 0, 0, 30)	2735.04646	2767.24625	[-0.22544656 0.07407938]	[0.43007599 0.00825053 0.01185375]	3071.9251	Not Significant
(2, 0, 2)	(4, 0, 2, 30)	2735.09198	2770.21903	[-0.79064747 0.07752083]	[0.99266738 0.11673976]	2761.89889	Not Significant
(2, 0, 5)	(4, 0, 2, 30)	2735.35234	2779.26114	[0.59690657 -0.52213157]	[-0.47229355 0.53426907 0.12274521 0.16429355 0.13721924]	4316.31614	Not Significant
(3, 0, 1)	(2, 0, 4, 30)	2735.38526	2770.5123	[-0.66227728 0.15725103 -0.0368438]	[0.86225529]	2671.63133	Not Significant
(2, 0, 5)	(4, 0, 0, 30)	2735.41933	2773.47363	[-0.25590029 -0.84600724]	[0.46376076 0.9615252 0.19404362 -0.00713611 0.06334664]	4316.31427	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 4)	(4, 0, 0, 30)	2735.4534	2770.58045	[-0.54509348 0.34921587]	[0.77816006 -0.23900292 0.00533781 0.16109422]	3255.98016	Not Significant
(4, 0, 1)	(1, 0, 4, 30)	2736.32967	2771.45672	[-0.64091894 0.1686378 0.01120015 0.06544778]	[0.84740877]	2757.29619	Not Significant
(2, 0, 3)	(4, 0, 1, 30)	2736.80058	2771.92762	[-0.61341519 -0.3611156]	[0.81129648 0.52014614 0.10137953]	3071.92463	Not Significant
(4, 0, 1)	(2, 0, 4, 30)	2737.10777	2775.16207	[-6.52651390e-01 1.55810784e-01 -1.78417330e-04 5.23464429e-02]	[0.85954749]	2757.29642	Not Significant
(2, 0, 3)	(4, 0, 2, 30)	2738.22665	2776.28095	[-0.57503479 -0.09868935]	[0.77054603 0.23834835 0.05101007]	3071.92432	Not Significant
(5, 0, 1)	(1, 0, 4, 30)	2738.79876	2776.85306	[-0.18763811 0.08279865 0.0224676 0.02747356 0.04348182]	[0.40260357]	2791.85895	Not Significant
(5, 0, 1)	(2, 0, 4, 30)	2739.09795	2780.0795	[-0.65200928 0.1536942 0.00194712 0.04056753 -0.01722818]	[0.85758513]	2791.85728	Not Significant
(1, 0, 1)	(4, 0, 3, 30)	2742.23099	2774.5102	[-0.47143119]	[0.76014576]	2716.50156	Not Significant
(1, 0, 3)	(4, 0, 3, 30)	2743.25967	2781.40784	[-0.42509411]	[0.72379415 0.0581154 0.08256797]	3079.51628	Not Significant
(1, 0, 2)	(4, 0, 3, 30)	2743.26349	2778.47717	[-0.49018192]	[0.78735628 0.02024146]	2737.59927	Not Significant
(1, 0, 4)	(4, 0, 3, 30)	2745.02852	2786.11116	[-0.43758242]	[0.73961367 0.05705044 0.10234079 0.03245799]	3289.1699	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 0)	(4, 0, 0, 30)	2747.81487	2768.35619	[0.22369546]		2769.0919	Not Significant
(1, 0, 5)	(4, 0, 3, 30)	2747.84947	2791.86658	[-0.38605862]	[0.67979537 0.05946716 0.13240235 0.08411493 0.06459378]	4417.0325	Not Significant
(1, 0, 0)	(4, 0, 1, 30)	2749.24406	2772.71986	[0.23273737]		2769.09173	Not Significant
(1, 0, 1)	(4, 0, 0, 30)	2749.35	2772.82579	[0.10723241]	[0.12500038]	2716.50236	Not Significant
(1, 0, 0)	(3, 0, 4, 30)	2749.53288	2778.87762	[0.19181181]		2769.09089	Not Significant
(1, 0, 0)	(4, 0, 3, 30)	2749.69969	2779.04443	[0.19618452]		2769.091	Not Significant
(1, 0, 0)	(1, 0, 4, 30)	2749.86484	2773.34063	[0.2461595]		2769.09205	Not Significant
(1, 0, 0)	(4, 0, 4, 30)	2750.87567	2783.15488	[0.21384695]		2769.09119	Not Significant
(1, 0, 0)	(4, 0, 2, 30)	2750.95399	2777.36425	[0.2262955]		2769.09185	Not Significant
(1, 0, 1)	(4, 0, 1, 30)	2751.17198	2777.58225	[0.37492991]	[-0.15217513]	2716.50197	Not Significant
(1, 0, 2)	(4, 0, 0, 30)	2751.29392	2777.70418	[0.07075129]	[0.15963808 0.02640981]	2737.60007	Not Significant
(1, 0, 0)	(2, 0, 4, 30)	2751.44649	2777.85675	[0.23284435]		2769.09187	Not Significant
(2, 0, 0)	(3, 0, 4, 30)	2751.5388	2783.81801	[0.19442868 -0.01601121]		2813.45461	Not Significant
(2, 0, 0)	(1, 0, 4, 30)	2751.83773	2778.248	[0.24417413 0.01452258]		2813.45582	Not Significant
(1, 0, 1)	(4, 0, 2, 30)	2752.80499	2782.14973	[0.0469991]	[0.17813936]	2716.50218	Not Significant
(1, 0, 2)	(4, 0, 1, 30)	2752.96543	2782.31017	[0.41788262]	[-0.18736573 -0.03771364]	2737.59943	Not Significant
(3, 0, 0)	(3, 0, 4, 30)	2753.09022	2788.30391	[0.19825155 -0.02540873 0.04062211]		2671.63178	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 0)	(2, 0, 4, 30)	2753.46128	2782.80602	[0.23282561 0.00336503]		2813.45566	Not Significant
(1, 0, 2)	(4, 0, 2, 30)	2753.57045	2785.84966	[-0.77096571]	[1.01082031 0.17461095]	2737.59864	Not Significant
(3, 0, 0)	(1, 0, 4, 30)	2753.7027	2783.04744	[0.24697367 0.00567383 0.03195492]		2671.63307	Not Significant
(1, 0, 3)	(4, 0, 0, 30)	2753.83209	2783.17683	[-0.04321686]	[0.27573563 0.05218731 0.02802091]	3079.5171	Not Significant
(4, 0, 0)	(3, 0, 4, 30)	2755.19561	2793.34377	[0.1986347 -0.0251791 0.04145251 -0.0036293]		2757.29699	Not Significant
(1, 0, 3)	(4, 0, 1, 30)	2755.30335	2787.58256	[0.37660706]	[-0.14602999 -0.03625637 0.04040287]	3079.51672	Not Significant
(3, 0, 0)	(2, 0, 4, 30)	2755.3166	2787.59581	[0.23464248 -0.00314783 0.02243148]		2671.6329	Not Significant
(1, 0, 4)	(4, 0, 2, 30)	2755.56252	2793.71069	[-0.91833602]	[1.21341235 0.15205361 0.07333892 0.21969479]	3289.1683	Not Significant
(1, 0, 3)	(4, 0, 2, 30)	2755.61338	2790.82706	[-0.79941544]	[1.03156489 0.1886763 0.00329734]	3079.51586	Not Significant
(4, 0, 0)	(1, 0, 4, 30)	2755.65751	2787.93672	[0.2486227 0.00688485 0.0277914 0.01811078]		2757.29818	Not Significant
(1, 0, 4)	(4, 0, 0, 30)	2756.14663	2788.42585	[-0.1196949]	[0.35208785 0.06996649 0.02952974 -0.00105112]	3289.17082	Not Significant
(5, 0, 0)	(3, 0, 4, 30)	2757.10379	2798.18642	[0.20053191 -0.02804229 0.04266518 -0.01523867 0.03793842]		2791.85785	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 0)	(2, 0, 4, 30)	2757.34106	2792.55474	[0.23627826 -0.00173183 0.02071429 0.01028967]		2757.29804	Not Significant
(1, 0, 4)	(4, 0, 1, 30)	2757.43966	2792.65334	[0.36178792]	[-0.13255945 -0.02767393 0.05486816 0.03729417]	3289.17061	Not Significant
(5, 0, 0)	(1, 0, 4, 30)	2757.53143	2792.74511	[0.25035462 0.00611689 0.0308489 0.00797046 0.03185067]		2791.859	Not Significant
(1, 0, 5)	(4, 0, 0, 30)	2757.76146	2792.97514	[-0.1917462]	[0.43202732 0.12644551 0.08868143 0.09658727 0.10663417]	4417.0331	Not Significant
(1, 0, 5)	(4, 0, 1, 30)	2757.79365	2795.94181	[0.20000207]	[0.04296243 0.05583728 0.10683813 0.09781517 0.1436616]	4417.03287	Not Significant
(1, 0, 5)	(4, 0, 2, 30)	2758.72447	2799.80711	[0.18078592]	[0.08442137 0.07018516 0.0711913 0.07576921 0.11995351]	4417.03232	Not Significant
(5, 0, 0)	(2, 0, 4, 30)	2759.24713	2797.39529	[0.23784437 -0.0024135 0.02332057 0.00066825 0.02983624]		2791.85887	Not Significant
(4, 0, 5)	(3, 0, 3, 30)	3228.06984	3280.76757	[-0.29636568 0.80999045 -0.25743594 -0.62481012]	[0.6403753 -0.77843889 0.22208429 1.05093038 0.23439001]	4224.65618	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	(3, 0, 3, 30)	3234.34687	3283.94473	[0.36472699 0.57883331 -0.71296345]	[-0.06161915 -0.74979528 0.77140814 0.39255405 -0.08017416]	4305.39899	Not Significant
(5, 0, 5)	(3, 0, 3, 30)	3234.54844	3290.34604	[-0.20119797 0.54508638 -0.70379264 -0.33481769 0.35712883]	[0.48226967 -0.50593846 0.80197212 0.77556942 -0.24890682]	4427.533	Not Significant
(4, 0, 5)	(1, 0, 3, 30)	3234.89025	3281.38825	[-0.05841901 1.34556385 -0.31175707 -0.78931094]	[0.3082555 -1.3716051 0.03541219 0.95639821 0.1366772]	4224.65552	Not Significant
(2, 0, 5)	(2, 0, 3, 30)	3236.42543	3279.82356	[0.94783463 -0.80229047]	[-0.73757565 0.68829726 0.24296711 0.0875834 0.10529628]	4316.31721	Not Significant
(5, 0, 5)	(2, 0, 3, 30)	3236.8422	3289.53993	[-0.22286382 0.49432797 -0.7777638 -0.3885589 0.28336198]	[0.51443624 -0.46489245 0.78988624 0.78167657 -0.20064553]	4427.53287	Not Significant
(2, 0, 5)	(1, 0, 3, 30)	3237.02915	3277.32742	[1.00341593 -0.80272914]	[-0.77458842 0.67400307 0.25712246 0.08244967 0.08988061]	4316.31793	Not Significant
(2, 0, 5)	(3, 0, 3, 30)	3239.08939	3285.58738	[0.89297604 -0.73379939]	[-0.66835595 0.62028951 0.23525929 0.10443394 0.11562733]	4316.31724	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 5)	(1, 0, 3, 30)	3240.01511	3289.61297	[0.07384977 0.71912563 -0.77980352 -0.20972143 0.50217396]	[0.23241494 -0.71337216 0.80540879 0.58755963 -0.46616592]	4427.53331	Not Significant
(3, 0, 5)	(2, 0, 3, 30)	3241.33624	3287.83424	[0.48596971 0.48758102 -0.82688028]	[-0.26307067 -0.58035625 0.79738557 0.27845645 -0.06890138]	4305.39976	Not Significant
(3, 0, 5)	(1, 0, 3, 30)	3241.58755	3284.98568	[0.49138873 0.56052694 -0.70945171]	[-0.23917153 -0.67920987 0.70817328 0.26980882 -0.14791428]	4305.39959	Not Significant
(1, 0, 5)	(3, 0, 3, 30)	3242.16985	3285.56798	[0.16295054]	[0.12683027 0.0366205 0.19650429 0.1774726 0.1738971]	4417.03302	Not Significant
(1, 0, 5)	(1, 0, 3, 30)	3243.67959	3280.87798	[0.1914124]	[0.09648728 0.0545495 0.1271645 0.10893901 0.11785516]	4417.03316	Not Significant
(1, 0, 5)	(2, 0, 3, 30)	3245.67929	3285.97756	[0.18716388]	[0.10032642 0.05553704 0.12731877 0.10940316 0.11822829]	4417.03315	Not Significant
(5, 0, 4)	(3, 0, 3, 30)	3247.59115	3300.39222	[-0.07536303 0.77240192 -0.30388482 -0.66538495 0.18267533]	[0.38638712 -0.75832882 0.31195603 0.95667444]	3733.71433	Not Significant
(4, 0, 5)	(2, 0, 3, 30)	3247.94136	3297.53922	[-0.11945421 -0.07291051 -0.06600522 -0.53128032]	[0.36339688 0.13966103 0.21601486 0.64510501 0.26522594]	4224.65908	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 4)	(3, 0, 3, 30)	3248.99233	3298.68745	[-0.04807701 0.69495041 -0.38265413 -0.4612828]	[0.28928873 -0.81213878 0.50196337 0.84216398]	3465.47703	Not Significant
(5, 0, 4)	(3, 0, 1, 30)	3250.92945	3297.51863	[-0.25517545 0.3517371 -0.44882682 -0.5283993 0.29532172]	[0.63006125 -0.26304436 0.60928755 0.98860132]	3733.71899	Not Significant
(5, 0, 4)	(1, 0, 3, 30)	3250.93023	3297.51941	[0.18465978 1.09649601 -0.25793514 -0.83774585 0.12652485]	[0.11245901 -1.2240602 0.0694775 0.976278]	3733.7141	Not Significant
(5, 0, 4)	(3, 0, 2, 30)	3251.82584	3301.52097	[-0.28548159 0.3263446 -0.48409344 -0.55341561 0.25550096]	[0.63800704 -0.26125779 0.61858716 0.98916266]	3733.71706	Not Significant
(5, 0, 5)	(3, 0, 1, 30)	3252.08123	3301.77636	[-0.10284725 0.62776669 -0.70680008 -0.30326682 0.37646379]	[0.36474761 -0.60968555 0.81664175 0.70335065 -0.33871501]	4427.53298	Not Significant
(5, 0, 4)	(3, 0, 0, 30)	3252.66609	3296.14933	[-0.24679367 0.40349187 -0.41191611 -0.56170729 0.25507931]	[0.63094176 -0.32832518 0.47299321 0.90834446]	3733.71449	Not Significant
(5, 0, 5)	(3, 0, 2, 30)	3252.98117	3305.78224	[-0.21712419 0.52924259 -0.71891436 -0.37725857 0.29856119]	[0.49582406 -0.4950585 0.78801573 0.78838207 -0.21568378]	4427.53293	Not Significant
(5, 0, 4)	(2, 0, 3, 30)	3253.46446	3303.15958	[0.17564271 1.1117168 -0.24236958 -0.85470858 0.13047974]	[0.11428003 -1.22273053 0.05697506 0.96842455]	3733.7134	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 4)	(2, 0, 3, 30)	3253.58927	3300.17845	[-0.20829161 0.81230584 -0.49289217 -0.65151093]	[0.42206602 -0.86513441 0.47807618 0.96050914]	3465.4772	Not Significant
(3, 0, 4)	(3, 0, 3, 30)	3253.5958	3300.18498	[0.43662633 0.46004343 -0.64971334]	[-0.17830625 -0.54852952 0.69222476 0.30205709]	3278.53522	Not Significant
(5, 0, 5)	(3, 0, 0, 30)	3254.94139	3301.53057	[-0.17477502 0.53178282 -0.80334069 -0.42177048 0.31643498]	[0.51234012 -0.51562418 0.78135852 0.83529125 -0.20481463]	4427.53252	Not Significant
(5, 0, 3)	(3, 0, 1, 30)	3255.22118	3298.70441	[0.47783227 0.12261978 -0.79299907 0.30888716 -0.01105544]	[-0.2857259 -0.12494785 0.90377797]	3759.74227	Not Significant
(5, 0, 3)	(3, 0, 2, 30)	3256.87638	3303.46556	[0.70508042 0.28609645 -0.7965573 0.24644825 -0.08620039]	[-0.50202968 -0.38704249 0.8135805]	3759.74138	Not Significant
(5, 0, 3)	(3, 0, 3, 30)	3257.66148	3307.35661	[0.46873476 0.08507391 -0.79552669 0.30275763 -0.03307663]	[-0.28425283 -0.1105639 0.89863043]	3759.74148	Not Significant
(3, 0, 4)	(2, 0, 3, 30)	3257.91551	3301.39874	[0.47546383 0.48592461 -0.84621481]	[-0.24047044 -0.54087899 0.78916108 0.27587841]	3278.53558	Not Significant
(2, 0, 4)	(3, 0, 3, 30)	3259.1621	3302.64533	[-0.44803697 0.48939732]	[0.80582261 -0.32435417 0.03407338 0.19591698]	3255.9805	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 0)	(3, 0, 0, 30)	3260.38142	3291.44087	[0.26719329 -0.01917406 0.04898618 -0.01862532 -0.01312553]		2791.85887	Not Significant
(5, 0, 3)	(3, 0, 0, 30)	3261.00526	3301.38255	[0.47947238 0.13703758 -0.92758041 0.28153169 0.0203295]	[-0.22964761 -0.19514274 0.97772669]	3759.73597	Not Significant
(5, 0, 0)	(3, 0, 1, 30)	3261.13288	3295.29828	[0.2795072 -0.00772435 0.06443134 -0.01192785 0.01270216]		2791.85865	Not Significant
(5, 0, 1)	(3, 0, 0, 30)	3261.25675	3295.42215	[-0.04024313 0.07598588 0.06171717 0.00147693 0.03202659]	[0.32090807]	2791.85884	Not Significant
(3, 0, 4)	(1, 0, 3, 30)	3261.61236	3301.98965	[0.29300412 0.35036133 -0.64645713]	[-0.01937214 -0.37092999 0.64521 0.27625731]	3278.5357	Not Significant
(1, 0, 4)	(1, 0, 3, 30)	3261.73174	3295.89714	[0.38851137]	[-0.10405122 -0.03224389 0.09610963 0.04806528]	3289.1709	Not Significant
(1, 0, 4)	(3, 0, 3, 30)	3261.86811	3302.2454	[0.384566]	[-0.115793 -0.05365795 0.17550642 0.10660717]	3289.17057	Not Significant
(5, 0, 2)	(3, 0, 0, 30)	3262.07075	3299.3421	[0.17653587 -0.5605745 0.23081059 0.02813088 0.11886958]	[0.11132271 0.58881863]	2909.92932	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 1)	(3, 0, 3, 30)	3262.72715	3306.21039	[-0.38692848 0.15611843 0.11036034 0.04445211 0.01818561]	[0.73370506]	2791.85875	Not Significant
(2, 0, 4)	(1, 0, 3, 30)	3262.83871	3300.11005	[-0.53764622 0.34230414]	[0.84052806 -0.15685985 0.06714063 0.19825624]	3255.98078	Not Significant
(5, 0, 0)	(3, 0, 2, 30)	3263.13209	3300.40343	[0.27976274 -0.00741434 0.06477907 -0.01183866 0.01309384]		2791.85874	Not Significant
(5, 0, 1)	(3, 0, 1, 30)	3263.15175	3300.4231	[0.16328646 0.02371045 0.06568329 -0.007917 0.0274196]	[0.11821976]	2791.85908	Not Significant
(4, 0, 4)	(1, 0, 3, 30)	3263.22292	3306.70616	[0.62145473 0.19180896 -0.79972607 0.30304027]	[-0.34601443 -0.24289467 0.80410044 -0.01867958]	3465.48181	Not Significant
(5, 0, 0)	(3, 0, 3, 30)	3263.64665	3304.02394	[0.27968365 -0.00538776 0.08385089 -0.00722611 0.01386067]		2791.85856	Not Significant
(1, 0, 4)	(2, 0, 3, 30)	3263.73165	3301.003	[0.39304371]	[-0.10832393 -0.03329071 0.09604099 0.04781118]	3289.17077	Not Significant
(5, 0, 2)	(3, 0, 1, 30)	3263.81147	3304.18876	[0.08397796 -0.67678009 0.26047034 0.02225443 0.12072151]	[0.19961075 0.72734078]	2909.92924	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 4)	(2, 0, 3, 30)	3264.41438	3304.79167	[-0.55564147 0.32980689]	[0.85947818 -0.14550183 0.06306733 0.20101679]	3255.98059	Not Significant
(5, 0, 1)	(3, 0, 2, 30)	3265.12742	3305.50471	[0.07053467 0.04681945 0.06382751 -0.00406122 0.03263528]	[0.21068566]	2791.85896	Not Significant
(5, 0, 2)	(3, 0, 2, 30)	3265.71153	3309.19477	[0.07828307 -0.6530636 0.25222409 0.02144841 0.1209362]	[0.20504515 0.70280861]	2909.92924	Not Significant
(5, 0, 2)	(3, 0, 3, 30)	3265.81968	3312.40887	[-0.04494013 -0.68061847 0.28890077 0.03750138 0.13842851]	[0.33737887 0.79542258]	2909.92934	Not Significant
(4, 0, 2)	(3, 0, 1, 30)	3270.99194	3308.3358	[1.35856167e+00 -1.14795589e+00 2.83174452e-01 -1.09515123e-03]	[-1.19980472 0.98004907]	2909.92707	Not Significant
(4, 0, 4)	(3, 0, 2, 30)	3271.57588	3318.2557	[-0.15143721 0.79080097 -0.5100522 -0.58729891]	[0.36768733 -0.84773901 0.50020935 0.89468914]	3465.47725	Not Significant
(2, 0, 3)	(1, 0, 3, 30)	3271.65248	3305.88435	[1.41288936 -0.85303635]	[-1.20585067 0.5920215 0.23578585]	3071.92522	Not Significant
(4, 0, 3)	(3, 0, 1, 30)	3272.19293	3312.64877	[0.48831017 0.11495809 -0.78670515 0.29236237]	[-0.30374435 -0.10511867 0.8875498]	3731.46212	Not Significant
(4, 0, 3)	(3, 0, 2, 30)	3273.05091	3316.61874	[0.43984136 0.12992527 -0.81939972 0.28366559]	[-0.26435226 -0.12573459 0.91651664]	3731.46079	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 5)	(3, 0, 0, 30)	3273.97573	3317.54355	[-0.28673057 0.78880105 -0.48692773 -0.72200536]	[0.60065766 -0.76025044 0.3404669 0.97097151 0.09682043]	4224.65554	Not Significant
(4, 0, 2)	(3, 0, 2, 30)	3274.06118	3314.51702	[1.33205099 -1.1218945 0.2965268 -0.01895636]	[-1.15756785 0.90641865]	2909.92784	Not Significant
(4, 0, 4)	(3, 0, 0, 30)	3274.39628	3314.85212	[-0.20059417 0.74053714 -0.49935595 -0.59243368]	[0.47536124 -0.76449605 0.43321867 0.84877159]	3465.47794	Not Significant
(4, 0, 3)	(2, 0, 3, 30)	3274.69243	3318.26026	[0.43913342 0.12180449 -0.85779936 0.28471209]	[-0.24689701 -0.1197962 0.92320059]	3731.46093	Not Significant
(4, 0, 3)	(1, 0, 3, 30)	3274.87233	3315.32817	[0.75517124 0.35444882 -0.98214261 0.24174747]	[-0.5313658 -0.41511336 0.93516167]	3731.4618	Not Significant
(4, 0, 3)	(3, 0, 3, 30)	3274.98995	3321.66977	[0.44522024 0.12237476 -0.80989239 0.28411638]	[-0.26922844 -0.11918021 0.90899735]	3731.46082	Not Significant
(4, 0, 2)	(3, 0, 3, 30)	3275.16005	3318.72788	[1.33388056 -1.12060435 0.25938821 0.01544289]	[-1.17253017 0.95189013]	2909.92727	Not Significant
(4, 0, 4)	(3, 0, 1, 30)	3275.36206	3318.92989	[0.40274795 0.51985544 -0.7095866 -0.0566396]	[-0.17926351 -0.56118082 0.69105492 0.29333323]	3465.47826	Not Significant
(5, 0, 3)	(1, 0, 3, 30)	3276.47902	3320.04685	[0.8038427 0.2574487 -0.93913662 0.28291807 -0.04462794]	[-0.56808981 -0.35618792 0.89008789]	3759.74277	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 3)	(3, 0, 3, 30)	3276.85593	3314.19979	[-0.47872205]	[0.81568079 0.15383463 0.08033934]	3079.51682	Not Significant
(4, 0, 0)	(3, 0, 0, 30)	3277.43339	3305.44128	[0.26611183 -0.0216911 0.04014293 -0.0325156]		2757.29803	Not Significant
(4, 0, 3)	(3, 0, 0, 30)	3277.94793	3315.29178	[0.47867216 0.1215677 -0.93089438 0.28631568]	[-0.23098172 -0.19561984 0.97859947]	3731.45607	Not Significant
(5, 0, 3)	(2, 0, 3, 30)	3278.11534	3324.79516	[0.76221285 0.26117621 -0.91663828 0.27339832 -0.07200677]	[-0.54523319 -0.3706004 0.87759853]	3759.74134	Not Significant
(4, 0, 0)	(3, 0, 1, 30)	3278.29935	3309.41922	[0.27707942 -0.00823946 0.05364625 -0.01629464]		2757.29782	Not Significant
(4, 0, 1)	(3, 0, 0, 30)	3278.53721	3309.65709	[-0.00684682 0.06612948 0.05066406 -0.0083519]	[0.28357039]	2757.29801	Not Significant
(2, 0, 3)	(3, 0, 3, 30)	3278.849	3319.30484	[-0.40943813 0.07052371]	[0.74783678 0.06500283 0.05941768]	3071.9252	Not Significant
(1, 0, 3)	(1, 0, 3, 30)	3279.02269	3310.14257	[0.40665347]	[-0.12178524 -0.03723104 0.06098953]	3079.51718	Not Significant
(4, 0, 1)	(3, 0, 3, 30)	3279.8426	3320.29844	[-0.39271515 0.15049346 0.09728762 0.02608572]	[0.73442546]	2757.29781	Not Significant
(4, 0, 2)	(3, 0, 0, 30)	3280.05689	3314.28876	[0.54775294 -0.69764286 0.1832809 0.04094658]	[-0.2712053 0.61976905]	2909.92832	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 0)	(3, 0, 2, 30)	3280.29541	3314.52728	[0.27666598 -0.0089729 0.05313393 -0.01666133]		2757.29794	Not Significant
(4, 0, 1)	(3, 0, 1, 30)	3280.29711	3314.52897	[0.37650114 -0.0362476 0.0539791 -0.02425511]	[-0.10119281]	2757.29858	Not Significant
(4, 0, 0)	(3, 0, 3, 30)	3280.8082	3318.15205	[0.27647698 -0.00767403 0.072483 -0.01195265]		2757.2977	Not Significant
(1, 0, 3)	(2, 0, 3, 30)	3280.96263	3315.19449	[0.21726439]	[0.06073144 0.00819872 0.06085508]	3079.51722	Not Significant
(4, 0, 5)	(3, 0, 2, 30)	3281.66247	3331.45428	[-0.11180602 -0.30714557 -0.12047117 -0.63680956]	[0.28946349 0.35988779 0.31595623 0.82570725 0.2771917]	4224.65605	Not Significant
(4, 0, 5)	(3, 0, 1, 30)	3281.78966	3328.46948	[0.71829069 -0.64622571 0.06403513 -0.20065242]	[-0.46341851 0.54557315 0.16967808 0.26138645 0.16274173]	4224.65721	Not Significant
(4, 0, 1)	(3, 0, 2, 30)	3282.20283	3319.54668	[0.61855607 -0.09237661 0.06063064 -0.05299486]	[-0.3464409]	2757.299	Not Significant
(3, 0, 3)	(1, 0, 3, 30)	3282.32975	3319.6736	[0.61155569 -0.92691521 0.4244022]	[-0.32722607 0.84310968 -0.18730718]	3226.02786	Not Significant
(2, 0, 3)	(2, 0, 3, 30)	3282.95925	3320.3031	[0.14647175 0.03758992]	[0.13126682 -0.00912255 0.05284865]	3071.92534	Not Significant
(3, 0, 3)	(2, 0, 3, 30)	3284.12498	3324.58082	[0.60868724 -0.94146195 0.41437966]	[-0.32757371 0.85545605 -0.17573395]	3226.02776	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 3)	(3, 0, 3, 30)	3284.7766	3328.34443	[0.68245268 -1.03883593 0.49737805]	[-0.41008768 0.95316972 -0.24129633]	3226.0278	Not Significant
(3, 0, 2)	(3, 0, 1, 30)	3287.84346	3322.14139	[1.35963667 -1.15257418 0.28979321]	[-1.19511234 0.97642318]	2886.11536	Not Significant
(3, 0, 2)	(1, 0, 3, 30)	3289.19165	3323.48958	[1.42573114 -1.23388792 0.3488884]	[-1.19363353 0.98052926]	2886.11686	Not Significant
(3, 0, 2)	(3, 0, 2, 30)	3290.68369	3328.09961	[1.35175696 -1.12971402 0.29647494]	[-1.15721518 0.9074006]	2886.11658	Not Significant
(4, 0, 2)	(1, 0, 3, 30)	3290.89089	3328.30681	[1.39850252 -1.17197109 0.28293811 0.0344527]	[-1.19648017 0.98664441]	2909.92717	Not Significant
(3, 0, 4)	(3, 0, 1, 30)	3291.99739	3332.53131	[0.50306624 0.45319021 -0.76198181]	[-0.30231559 -0.49502241 0.74802219 0.21977979]	3278.53613	Not Significant
(4, 0, 2)	(2, 0, 3, 30)	3292.20501	3332.73893	[1.33082067 -1.12769174 0.24784923 0.02187053]	[-1.17030429 0.96599136]	2909.92806	Not Significant
(3, 0, 2)	(3, 0, 3, 30)	3293.18011	3333.71403	[1.33914901 -1.07652258 0.2567839]	[-1.15517157 0.88077303]	2886.11659	Not Significant
(3, 0, 2)	(2, 0, 3, 30)	3293.26749	3330.68341	[1.40121221 -1.11136392 0.29288344]	[-1.16044611 0.85148663]	2886.11455	Not Significant
(3, 0, 4)	(3, 0, 2, 30)	3293.86582	3337.51774	[0.46280383 0.49565795 -0.82084998]	[-0.25845815 -0.55056009 0.79619704 0.24181822]	3278.5365	Not Significant
(3, 0, 5)	(3, 0, 1, 30)	3293.97602	3337.62793	[0.43815477 0.55263212 -0.83094192]	[-0.22934118 -0.62980831 0.84590885 0.23420827 -0.02301401]	4305.39909	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 0)	(3, 0, 0, 30)	3294.08716	3319.03111	[0.26519412 -0.02394489 0.0251008]		2671.63291	Not Significant
(3, 0, 0)	(3, 0, 1, 30)	3295.11503	3323.17697	[0.27558246 -0.01143252 0.04355438]		2671.63268	Not Significant
(3, 0, 5)	(3, 0, 2, 30)	3295.12435	3341.89425	[0.4421401 0.57017772 -0.75892035]	[-0.23745387 -0.65349782 0.79836577 0.22031623 -0.06880642]	4305.39989	Not Significant
(3, 0, 1)	(3, 0, 0, 30)	3295.28815	3323.35009	[0.01626745 0.05570108 0.04641417]	[0.25934254]	2671.6329	Not Significant
(1, 0, 2)	(3, 0, 3, 30)	3295.81456	3330.1125	[-0.52959454]	[0.85487727 0.10266481]	2737.59976	Not Significant
(1, 0, 2)	(1, 0, 3, 30)	3295.86707	3323.92901	[0.45012165]	[-0.1657364 -0.0425526]	2737.60012	Not Significant
(2, 0, 2)	(3, 0, 3, 30)	3296.56141	3333.97734	[-0.24410341 0.2433917]	[0.5844298 -0.1483119]	2761.90054	Not Significant
(3, 0, 1)	(3, 0, 3, 30)	3296.65916	3334.07508	[-0.37242341 0.14722007 0.09231109]	[0.71159529]	2671.63272	Not Significant
(3, 0, 3)	(3, 0, 0, 30)	3296.85203	3331.14996	[0.3057752 -0.8690473 0.44536528]	[-0.05571223 0.93132158 -0.26994332]	3226.02527	Not Significant
(3, 0, 4)	(3, 0, 0, 30)	3296.89085	3334.30678	[0.26739135 0.32065984 -0.67419107]	[0.00263479 -0.34606501 0.67074984 0.28044307]	3278.53501	Not Significant
(3, 0, 2)	(3, 0, 0, 30)	3296.98126	3328.1612	[0.65809915 -0.79578435 0.21431195]	[-0.37943334 0.66202513]	2886.11657	Not Significant
(3, 0, 0)	(3, 0, 2, 30)	3297.1019	3328.28183	[0.27478273 -0.01253989 0.04247596]		2671.63279	Not Significant
(3, 0, 1)	(3, 0, 1, 30)	3297.1352	3328.31514	[0.33079017 -0.02616117 0.0412281]	[-0.05601265]	2671.63351	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 0)	(3, 0, 3, 30)	3297.56589	3331.86382	[0.27431109 -0.01197519 0.06385226]		2671.63254	Not Significant
(2, 0, 2)	(1, 0, 3, 30)	3297.70003	3328.87996	[0.04313835 0.18373546]	[0.23861755 -0.12516592]	2761.90093	Not Significant
(1, 0, 2)	(2, 0, 3, 30)	3297.75101	3328.93095	[0.26270414]	[0.01301961 -0.00076332]	2737.6	Not Significant
(3, 0, 1)	(3, 0, 2, 30)	3299.13202	3333.42995	[0.28903728 -0.01611416 0.04216189]	[-0.01428787]	2671.63355	Not Significant
(3, 0, 5)	(3, 0, 0, 30)	3299.13778	3339.6717	[0.20610637 0.22605289 -0.72771385]	[0.06070682 -0.25483689 0.73376991 0.31650687 0.02672987]	4305.3983	Not Significant
(2, 0, 2)	(2, 0, 3, 30)	3299.47787	3333.7758	[-0.01364041 0.17915983]	[0.29141099 -0.11146578]	2761.90067	Not Significant
(3, 0, 3)	(3, 0, 1, 30)	3300.57007	3337.986	[0.41908671 -0.82670334 0.49276442]	[-0.16570714 0.83501397 -0.32446596]	3226.02941	Not Significant
(5, 0, 2)	(1, 0, 3, 30)	3302.25343	3342.78735	[0.0827491 -0.69384208 0.23739928 0.0084948 0.09409817]	[0.19615885 0.74010862]	2909.92904	Not Significant
(3, 0, 3)	(3, 0, 2, 30)	3302.63589	3343.16981	[0.37583079 -0.78532074 0.41152265]	[-0.10860664 0.78582691 -0.23942732]	3226.02805	Not Significant
(5, 0, 2)	(2, 0, 3, 30)	3304.15592	3347.80784	[0.0985153 -0.71928622 0.2397865 0.01095854 0.08902378]	[0.17904272 0.75805327]	2909.92926	Not Significant
(2, 0, 3)	(3, 0, 1, 30)	3307.70638	3342.06998	[1.11138591 -0.67849265]	[-0.92606215 0.49921064 0.24893946]	3071.92567	**Significant**

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 5)	(3, 0, 1, 30)	3309.72406	3350.33559	[0.93402943 -0.75039162]	[-0.7424735 0.67127044 0.19885787 0.1127383 0.09009503]	4316.31746	Not Significant
(2, 0, 0)	(3, 0, 0, 30)	3311.41475	3333.2825	[0.26513392 -0.01494833]		2813.45566	Not Significant
(2, 0, 5)	(3, 0, 2, 30)	3311.96227	3355.69777	[0.92761492 -0.72457106]	[-0.7226113 0.61546964 0.22417778 0.10312704 0.08224017]	4316.31728	Not Significant
(2, 0, 0)	(3, 0, 1, 30)	3312.20001	3337.19172	[0.27587186 0.00633685]		2813.45547	Not Significant
(2, 0, 1)	(3, 0, 0, 30)	3312.33922	3337.33093	[0.07575045 0.04995379]	[0.20276794]	2671.63269	Not Significant
(1, 0, 1)	(1, 0, 3, 30)	3312.87673	3337.86844	[0.3186293]	[-0.03796922]	2716.50253	Not Significant
(2, 0, 3)	(3, 0, 2, 30)	3313.52605	3351.01362	[1.17259191 -0.65754281]	[-0.90953831 0.36842852 0.29213504]	3071.92578	Not Significant
(2, 0, 2)	(3, 0, 0, 30)	3313.76061	3341.87629	[-0.07819328 0.19365924]	[0.3583007 -0.10998363]	2761.90062	Not Significant
(2, 0, 1)	(3, 0, 1, 30)	3314.07833	3342.19401	[0.40573124 -0.02614281]	[-0.13291877]	2671.63292	Not Significant
(2, 0, 0)	(3, 0, 2, 30)	3314.19416	3342.30983	[0.27549182 0.00550899]		2813.45556	Not Significant
(1, 0, 1)	(2, 0, 3, 30)	3314.69048	3342.80616	[0.27646517]	[0.00194383]	2716.50241	Not Significant
(2, 0, 1)	(3, 0, 3, 30)	3314.75853	3349.12213	[-0.39560114 0.14274075]	[0.75410248]	2671.63244	Not Significant
(2, 0, 1)	(1, 0, 3, 30)	3314.85998	3342.97565	[0.50378918 -0.04456129]	[-0.22273765]	2671.633	Not Significant
(1, 0, 1)	(3, 0, 3, 30)	3314.93825	3346.17789	[0.21153976]	[0.07360804]	2716.50216	Not Significant
(2, 0, 0)	(3, 0, 3, 30)	3315.05141	3346.29105	[0.27423994 0.01315783]		2813.45534	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 2)	(3, 0, 1, 30)	3315.52378	3346.76342	[0.12272256 0.18059419]	[0.15744666 -0.15204047]	2761.90079	Not Significant
(2, 0, 3)	(3, 0, 0, 30)	3315.8435	3347.08314	[-0.06248793 0.07704496]	[0.33982808 0.00177018 0.04287129]	3071.92515	Not Significant
(2, 0, 1)	(3, 0, 2, 30)	3316.06052	3347.30016	[0.47933485 -0.04259183]	[-0.20770766]	2671.63289	Not Significant
(3, 0, 1)	(1, 0, 3, 30)	3316.52191	3347.76155	[0.0092046 0.06599339 0.04733999]	[0.26917687]	2671.63298	Not Significant
(2, 0, 1)	(2, 0, 3, 30)	3316.63122	3347.87086	[0.12320122 0.04177211]	[0.15442903]	2671.63267	Not Significant
(2, 0, 4)	(3, 0, 0, 30)	3316.82567	3351.18928	[-0.495503 0.37409165]	[0.79555215 -0.20093792 0.01132561 0.14526188]	3255.98038	Not Significant
(2, 0, 2)	(3, 0, 2, 30)	3317.52263	3351.88623	[0.11106579 0.18211652]	[0.16913496 -0.15045795]	2761.90075	Not Significant
(2, 0, 5)	(3, 0, 0, 30)	3318.14862	3355.63619	[0.16754939 -0.51568033]	[0.11047222 0.54284597 0.20629318 0.06986334 0.13696938]	4316.31692	Not Significant
(3, 0, 1)	(2, 0, 3, 30)	3318.31243	3352.67603	[-0.01036796 0.06773931 0.04705392]	[0.28731153]	2671.63285	Not Significant
(4, 0, 1)	(1, 0, 3, 30)	3318.52312	3352.88672	[0.02329743 0.0637069 0.0486666 -0.01395032]	[0.25530114]	2757.29803	Not Significant
(2, 0, 4)	(3, 0, 1, 30)	3318.8106	3356.29816	[-0.53858526 0.33563466]	[0.83855566 -0.15353084 0.02540632 0.15170808]	3255.98079	Not Significant
(4, 0, 1)	(2, 0, 3, 30)	3320.31549	3357.80306	[0.01292798 0.06285405 0.04808896 -0.01327687]	[0.26410918]	2757.29795	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 1)	(1, 0, 3, 30)	3320.52055	3358.00812	[0.0023895 0.06870912 0.04845911 -0.01491141 0.01510183]	[0.27743459]	2791.85896	Not Significant
(2, 0, 4)	(3, 0, 2, 30)	3320.53202	3361.14356	[-0.59408536 0.29281326]	[0.89697018 -0.09889744 0.04007873 0.16304695]	3255.9806	Not Significant
(5, 0, 1)	(2, 0, 3, 30)	3322.31151	3362.92304	[-0.00562034 0.06696537 0.04770536 -0.01427529 0.01523368]	[0.28373333]	2791.85888	Not Significant
(1, 0, 0)	(3, 0, 0, 30)	3332.23889	3351.01828	[0.28348125]		2769.09186	Not Significant
(1, 0, 0)	(3, 0, 1, 30)	3332.52559	3354.43488	[0.30126195]		2769.09162	Not Significant
(1, 0, 1)	(3, 0, 0, 30)	3333.47826	3355.38755	[0.18644221]	[0.11346215]	2716.50232	Not Significant
(1, 0, 0)	(1, 0, 3, 30)	3333.49634	3355.40563	[0.30952473]		2769.09203	Not Significant
(1, 0, 1)	(3, 0, 1, 30)	3334.3243	3359.36349	[0.37512566]	[-0.08338861]	2716.50222	Not Significant
(1, 0, 0)	(3, 0, 2, 30)	3334.52494	3359.56413	[0.3010992]		2769.09183	Not Significant
(1, 0, 2)	(3, 0, 0, 30)	3334.99648	3360.03567	[0.12932974]	[0.16264964 0.05383693]	2737.60006	Not Significant
(1, 0, 0)	(2, 0, 3, 30)	3335.26858	3360.30777	[0.30363991]		2769.09192	Not Significant
(2, 0, 0)	(1, 0, 3, 30)	3335.32836	3360.36755	[0.30033893 0.03274986]		2813.45579	Not Significant
(1, 0, 0)	(3, 0, 3, 30)	3335.47658	3363.64567	[0.30426089]		2769.09156	Not Significant
(1, 0, 2)	(3, 0, 1, 30)	3336.11893	3364.28802	[0.38429166]	[-0.09090372 -0.00782567]	2737.6	Not Significant
(1, 0, 1)	(3, 0, 2, 30)	3336.23726	3364.40634	[0.43073195]	[-0.14495331]	2716.50225	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 3)	(3, 0, 0, 30)	3336.63185	3364.80094	[-0.01751594]	[0.31158281 0.09197416 0.07350172]	3079.5171	Not Significant
(3, 0, 0)	(1, 0, 3, 30)	3337.03539	3365.20448	[0.30098143 0.01841652 0.03722513]		2671.63304	Not Significant
(2, 0, 0)	(2, 0, 3, 30)	3337.15611	3365.3252	[0.29543341 0.02788459]		2813.4557	Not Significant
(1, 0, 2)	(3, 0, 2, 30)	3337.94267	3369.24166	[0.48434656]	[-0.1934242 -0.02996201]	2737.59993	Not Significant
(1, 0, 3)	(3, 0, 1, 30)	3337.94675	3369.24574	[0.30639037]	[-0.01183725 -0.00090986 0.06571167]	3079.51719	Not Significant
(3, 0, 0)	(2, 0, 3, 30)	3338.84949	3370.14848	[0.29608947 0.01457137 0.03500413]		2671.63294	Not Significant
(4, 0, 0)	(1, 0, 3, 30)	3338.87355	3370.17254	[0.30023583 0.01820723 0.04945391 -0.03333895]		2757.29818	Not Significant
(1, 0, 4)	(3, 0, 0, 30)	3338.88927	3370.18825	[-0.09120076]	[0.38525833 0.11301611 0.08433723 0.01432699]	3289.17084	Not Significant
(1, 0, 3)	(3, 0, 2, 30)	3339.83683	3374.26572	[0.41717745]	[-0.12413699 -0.02747791 0.06266388]	3079.51723	Not Significant
(1, 0, 4)	(3, 0, 1, 30)	3340.20575	3374.63464	[0.2667173]	[0.02806493 0.01049807 0.07047584 0.00810266]	3289.17102	Not Significant
(4, 0, 0)	(2, 0, 3, 30)	3340.66781	3375.0967	[0.29519006 0.01421581 0.04847556 -0.03690713]		2757.29808	Not Significant
(5, 0, 0)	(1, 0, 3, 30)	3340.89342	3375.32231	[0.30007181 0.01885619 0.04911263 -0.03074642 -0.00629035]		2791.85902	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 5)	(3, 0, 0, 30)	3341.02212	3375.45101	[-0.37348883]	[0.66928303 0.20766459 0.12085639 0.05891393 0.03146181]	4417.03296	Not Significant
(1, 0, 5)	(3, 0, 1, 30)	3341.61414	3379.17292	[0.06638026]	[0.2322 0.09455444 0.10362797 0.05254331 0.08073872]	4417.03309	Not Significant
(1, 0, 4)	(3, 0, 2, 30)	3342.0761	3379.63488	[0.41290091]	[-0.12013666 -0.02538497 0.06460635 -0.00099155]	3289.1711	Not Significant
(5, 0, 0)	(2, 0, 3, 30)	3342.69528	3380.25406	[0.29482229 0.01493916 0.04795271 -0.03422115 -0.00701876]		2791.85892	Not Significant
(1, 0, 5)	(3, 0, 2, 30)	3343.49749	3384.18618	[0.20619812]	[0.09473366 0.06031225 0.09962893 0.0446002 0.08328847]	4417.03292	Not Significant
(5, 0, 5)	(1, 0, 2, 30)	3821.12778	3870.14565	[-0.08664546 0.42565493 -0.58723036 -0.58057142 0.39865604]	[0.51543903 -0.34812139 0.57452431 0.89472046 -0.09697488]	4427.53216	Not Significant
(3, 0, 5)	(1, 0, 2, 30)	3821.83275	3864.31491	[-1.43111562 -0.40814288 0.08382054]	[1.8198026 1.02412252 0.25280911 0.0396864 -0.08174504]	4305.39418	Not Significant
(5, 0, 5)	(2, 0, 2, 30)	3822.28897	3874.5747	[-0.10885639 0.43728466 -0.56302272 -0.59403741 0.35975678]	[0.52791949 -0.36519068 0.5620004 0.928623 -0.06338115]	4427.5322	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	(2, 0, 2, 30)	3823.66456	3869.41457	[-1.40706581 -0.3471266 0.12795791]	[1.78845611 0.93814399 0.17884649 0.02319441 -0.0825481]	4305.39225	Not Significant
(4, 0, 5)	(1, 0, 2, 30)	3824.56823	3870.31824	[0.03292855 0.06132187 0.08786756 -0.88753628]	[0.3086435 0.04890176 -0.06812038 0.90794485 0.34530195]	4224.65495	Not Significant
(4, 0, 5)	(2, 0, 2, 30)	3826.56154	3875.57941	[-0.07767488 -0.02249193 0.071159 -0.80176655]	[0.41792109 0.15997986 0.02533562 0.87485717 0.35868542]	4224.65519	Not Significant
(2, 0, 5)	(1, 0, 2, 30)	3828.99015	3868.20445	[-0.08408117 -0.70530194]	[0.42058985 0.86550603 0.33211054 0.10354466 0.12639202]	4316.31624	Not Significant
(1, 0, 5)	(1, 0, 2, 30)	3829.50985	3865.45629	[-0.32964232]	[0.67607663 0.26380126 0.14553549 0.06388737 0.04915896]	4417.03304	Not Significant
(2, 0, 5)	(2, 0, 2, 30)	3830.95406	3873.43622	[-0.06688856 -0.70554475]	[0.40241626 0.86008099 0.32996833 0.10509517 0.1269818]	4316.31657	Not Significant
(1, 0, 5)	(2, 0, 2, 30)	3831.42648	3870.64078	[-0.31372487]	[0.65715546 0.25829624 0.14284524 0.06369322 0.05161136]	4417.03299	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 4)	(2, 0, 1, 30)	3837.15141	3882.9734	[-0.15720848 0.5192023 -0.42695666 -0.60844173 0.26413397]	[0.5838101 -0.41281317 0.41720449 0.90217745]	3733.71375	Not Significant
(5, 0, 5)	(2, 0, 0, 30)	3837.22351	3883.0455	[0.00953446 0.44870853 -0.66265966 -0.52827708 0.48514433]	[0.40608836 -0.38314511 0.67448073 0.84664043 -0.22694585]	4427.5325	Not Significant
(5, 0, 4)	(2, 0, 0, 30)	3837.45092	3879.99991	[-0.11596605 0.79119092 -0.16823816 -0.63736103 0.15758524]	[0.5409661 -0.66407413 0.05654658 0.73336531]	3733.71203	Not Significant
(5, 0, 4)	(1, 0, 2, 30)	3837.47101	3883.29301	[-0.15022703 0.52856792 -0.41500254 -0.62199703 0.27316351]	[0.57734503 -0.416386 0.40458487 0.8992463]	3733.71329	Not Significant
(2, 0, 4)	(1, 0, 2, 30)	3837.54327	3873.54627	[-1.60169843 -0.65010674]	[1.99056408 1.32391442 0.47258408 0.19806753]	3255.97913	Not Significant
(5, 0, 5)	(2, 0, 1, 30)	3839.07984	3888.17483	[-0.11450098 0.435749 -0.56572676 -0.60031813 0.35737912]	[0.53177133 -0.36333942 0.56284981 0.93414504 -0.05782566]	4427.53196	Not Significant
(5, 0, 4)	(2, 0, 2, 30)	3839.13459	3888.22959	[-0.15177211 0.51737498 -0.43101445 -0.61236123 0.2730195]	[0.58007735 -0.40953654 0.42245867 0.90591986]	3733.7136	Not Significant
(2, 0, 4)	(2, 0, 2, 30)	3839.46495	3878.74095	[-1.59842835 -0.64489259]	[1.984294 1.30628521 0.45657923 0.1924668]	3255.97893	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 4)	(1, 0, 2, 30)	3842.68018	3875.41017	[-0.9144926]	[1.2880922 0.40208961 0.21398279 0.19933178]	3289.16929	Not Significant
(1, 0, 4)	(2, 0, 2, 30)	3844.58551	3880.58851	[-0.91543481]	[1.28710096 0.39872394 0.21264143 0.19933089]	3289.16889	Not Significant
(5, 0, 0)	(2, 0, 0, 30)	3845.16198	3874.61898	[0.33712085 0.02433535 0.0220945 -0.04538082 -0.02133536]		2791.85888	Not Significant
(5, 0, 1)	(2, 0, 0, 30)	3846.43752	3879.16751	[0.09599117 0.11842348 0.04464329 -0.03837017 0.01597766]	[0.25182102]	2791.85893	Not Significant
(5, 0, 1)	(2, 0, 1, 30)	3846.56018	3882.56317	[-0.52726669 0.30037686 0.04855745 -0.00431154 -0.07392212]	[0.85829192]	2791.85753	Not Significant
(5, 0, 0)	(2, 0, 1, 30)	3846.97901	3879.709	[0.34465499 0.03140692 0.02570427 -0.04051894 -0.01270852]		2791.85864	Not Significant
(3, 0, 4)	(1, 0, 2, 30)	3847.1884	3886.4644	[0.36911117 0.35127358 -0.75235541]	[-0.03727413 -0.38650063 0.70193056 0.3077788]	3278.53349	Not Significant
(5, 0, 3)	(2, 0, 1, 30)	3847.49831	3890.04731	[0.85836778 0.24929187 -1.00235585 0.32159887 0.0013066]	[-0.52973633 -0.35176644 0.88729901]	3759.74039	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 2)	(2, 0, 1, 30)	3847.87652	3887.15252	[-0.1751562 -0.44471696 0.23510205 -0.00638616 0.06612534]	[0.50436383 0.62510907]	2909.92852	Not Significant
(5, 0, 2)	(2, 0, 0, 30)	3848.01189	3884.01488	[0.07050645 0.05173804 0.07131857 -0.03206264 0.03332316]	[0.27876817 0.07629304]	2909.93073	Not Significant
(3, 0, 4)	(2, 0, 2, 30)	3848.42005	3890.96905	[0.36944689 0.34330689 -0.75265056]	[-0.04689112 -0.37440369 0.70309929 0.30055432]	3278.5332	Not Significant
(5, 0, 1)	(2, 0, 2, 30)	3848.50147	3887.77746	[-0.52931891 0.30260133 0.04787839 -0.00621535 -0.07437566]	[0.85894348]	2791.85725	Not Significant
(5, 0, 0)	(2, 0, 2, 30)	3848.93523	3884.93823	[0.34813599 0.03141379 0.03063388 -0.04043177 -0.00797428]		2791.8585	Not Significant
(5, 0, 3)	(2, 0, 0, 30)	3849.67489	3888.95088	[0.43324319 0.05925252 -0.74021399 0.30370411 0.00547597]	[-0.08969562 -0.07023847 0.72921324]	3759.74108	Not Significant
(5, 0, 2)	(2, 0, 2, 30)	3849.85861	3892.4076	[-0.18608359 -0.44195984 0.23595652 -0.00745275 0.0674941]	[0.51590302 0.62473243]	2909.92839	Not Significant
(5, 0, 3)	(2, 0, 2, 30)	3850.67667	3896.49866	[0.86308793 0.13432107 -0.88838521 0.30969674 -0.04212275]	[-0.54136282 -0.24868492 0.78485858]	3759.74153	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 4)	(1, 0, 2, 30)	3850.92479	3893.47379	[-0.34532089 -0.39219067 -0.32802132 0.32772751]	[0.67897131 0.6451038 0.54173184 -0.11118967]	3465.47602	Not Significant
(4, 0, 4)	(2, 0, 2, 30)	3852.91916	3898.74115	[-0.32538918 -0.37034155 -0.36068203 0.3262812]	[0.65895015 0.61167597 0.56072045 -0.10176393]	3465.47598	Not Significant
(4, 0, 5)	(2, 0, 0, 30)	3861.07836	3903.69385	[0.23513133 0.33091895 0.26358657 -0.90913928]	[0.11575782 -0.31400722 -0.38435309 0.82565298 0.35812769]	4224.65492	Not Significant
(1, 0, 3)	(1, 0, 2, 30)	3861.5796	3891.08263	[-0.43462681]	[0.77011823 0.26796814 0.10681699]	3079.51681	Not Significant
(4, 0, 5)	(2, 0, 1, 30)	3861.59844	3907.49204	[0.03483748 0.05954467 0.08812446 -0.88366243]	[0.30460726 0.04802015 -0.06873332 0.90463105 0.34508229]	4224.655	Not Significant
(4, 0, 0)	(2, 0, 0, 30)	3861.93447	3888.15939	[0.3376691 0.02183538 0.02007048 -0.05502597]		2757.29804	Not Significant
(2, 0, 3)	(1, 0, 2, 30)	3863.17611	3895.95726	[-0.57496361 -0.28071637]	[0.89918072 0.56888482 0.1856234]	3071.92488	Not Significant
(4, 0, 1)	(2, 0, 0, 30)	3863.25016	3892.75319	[0.13004984 0.10798651 0.04248515 -0.0366141]	[0.21793407]	2757.2981	Not Significant
(1, 0, 3)	(2, 0, 2, 30)	3863.53641	3896.31756	[-0.41720761]	[0.75037898 0.26107572 0.10580949]	3079.51666	Not Significant
(4, 0, 0)	(2, 0, 1, 30)	3863.73259	3893.23562	[0.34567165 0.03012796 0.02425754 -0.04585752]		2757.29779	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 3)	(2, 0, 1, 30)	3864.11591	3903.45328	[0.85646084 0.25733422 -1.02621987 0.32542649]	[-0.53018807 -0.36249958 0.90825441]	3731.45994	Not Significant
(4, 0, 1)	(2, 0, 1, 30)	3864.2374	3897.01854	[-0.25746519 0.21101344 0.03885381 -0.02374347]	[0.59164124]	2757.29755	Not Significant
(4, 0, 3)	(1, 0, 2, 30)	3864.40468	3903.74205	[0.86408653 0.26205404 -1.0418124 0.34250476]	[-0.51157005 -0.3850853 0.9224866]	3731.46018	Not Significant
(4, 0, 2)	(2, 0, 0, 30)	3865.05698	3897.83813	[0.63113844 -0.65333357 0.19926876 0.04766387]	[-0.28046953 0.58920396]	2909.92836	Not Significant
(2, 0, 3)	(2, 0, 2, 30)	3865.16242	3901.22168	[-0.59516408 -0.29919804]	[0.91971554 0.59290746 0.1917052]	3071.92463	Not Significant
(4, 0, 2)	(2, 0, 1, 30)	3865.17503	3901.23429	[-0.14811171 -0.64865209 0.2637009 -0.00721082]	[0.4723359 0.83379798]	2909.92719	Not Significant
(3, 0, 3)	(1, 0, 2, 30)	3865.33501	3901.39427	[-0.28138795 -0.64802412 0.16274977]	[0.6098217 0.86144002 0.10644755]	3226.02715	Not Significant
(4, 0, 4)	(2, 0, 0, 30)	3865.65181	3904.98918	[0.51504658 0.25748235 -0.80593237 0.12682657]	[-0.18067884 -0.31156147 0.75639033 0.18782399]	3465.477	Not Significant
(4, 0, 0)	(2, 0, 2, 30)	3865.68392	3898.46507	[0.34918547 0.03061969 0.02927642 -0.04386471]		2757.29768	Not Significant
(4, 0, 3)	(2, 0, 2, 30)	3865.99328	3908.60877	[0.87334666 0.21559556 -0.98048957 0.3152434]	[-0.54585751 -0.32017388 0.8657417]	3731.46086	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 3)	(1, 0, 2, 30)	3866.15437	3908.76986	[0.88836175 0.21284716 -1.00057289 0.35201203 -0.01498198]	[-0.53855284 -0.33508005 0.8780337]	3759.74045	Not Significant
(4, 0, 1)	(2, 0, 2, 30)	3866.23349	3902.29275	[-0.25448414 0.2104507 0.03816906 -0.02436254]	[0.58815201]	2757.29737	Not Significant
(4, 0, 3)	(2, 0, 0, 30)	3866.31044	3902.3697	[0.43976256 0.05855852 -0.73637304 0.30546362]	[-0.09449465 -0.07473367 0.72477883]	3731.46008	Not Significant
(4, 0, 2)	(2, 0, 2, 30)	3867.18592	3906.5233	[-0.1507557 -0.64590354 0.25887161 -0.01293711]	[0.47456405 0.82954984]	2909.92735	Not Significant
(3, 0, 3)	(2, 0, 2, 30)	3867.29339	3906.63077	[-0.24853281 -0.66187841 0.1900656]	[0.57708649 0.86917921 0.08436351]	3226.02699	Not Significant
(4, 0, 4)	(2, 0, 1, 30)	3869.73783	3912.35333	[-0.31616933 -0.27972661 -0.38494105 0.30195695]	[0.65044793 0.51965264 0.5578072 -0.07503728]	3465.47525	Not Significant
(3, 0, 0)	(2, 0, 0, 30)	3879.70953	3902.69196	[0.33808385 0.01656726 -0.00185299]		2671.63289	Not Significant
(3, 0, 1)	(2, 0, 0, 30)	3880.88279	3907.14842	[0.11033127 0.10933121 0.04187606]	[0.2382878]	2671.63295	Not Significant
(1, 0, 2)	(1, 0, 2, 30)	3880.95947	3907.2251	[-0.06305057]	[0.39156997 0.12682105]	2737.59928	Not Significant
(3, 0, 0)	(2, 0, 1, 30)	3881.45805	3907.72367	[0.34736296 0.02643983 0.00722494]		2671.63259	Not Significant
(3, 0, 1)	(2, 0, 1, 30)	3881.5099	3911.05874	[-0.32288664 0.22265499 0.04100294]	[0.65392085]	2671.63237	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 2)	(1, 0, 2, 30)	3881.63837	3911.1872	[-0.5275384 0.27813094]	[0.86301412 0.02165907]	2761.89805	Not Significant
(3, 0, 2)	(2, 0, 0, 30)	3882.45152	3912.00036	[-0.01410531 0.17143562 0.04376085]	[0.36281958 -0.02177242]	2886.11642	Not Significant
(1, 0, 2)	(2, 0, 2, 30)	3882.55793	3912.10676	[-0.00551587]	[0.33154235 0.11851715]	2737.59952	Not Significant
(3, 0, 2)	(2, 0, 1, 30)	3882.60865	3915.44069	[-0.15573814 -0.64035039 0.2637]	[0.47534219 0.83236119]	2886.11368	Not Significant
(3, 0, 2)	(1, 0, 2, 30)	3882.61415	3915.44619	[-0.15607494 -0.62597991 0.25900578]	[0.47663796 0.81972625]	2886.11566	Not Significant
(3, 0, 4)	(2, 0, 0, 30)	3883.13738	3919.25262	[0.40808264 0.37394829 -0.73545845]	[-0.08166122 -0.40056684 0.67973434 0.27498124]	3278.53484	Not Significant
(2, 0, 2)	(2, 0, 2, 30)	3883.23866	3916.07069	[-0.53797333 0.30258322]	[0.86828577 0.00587581]	2761.89843	Not Significant
(3, 0, 0)	(2, 0, 2, 30)	3883.40291	3912.95174	[0.35123537 0.02734616 0.01379547]		2671.63251	Not Significant
(3, 0, 1)	(2, 0, 2, 30)	3883.48706	3916.31909	[-0.32880544 0.22615267 0.03902854]	[0.65863934]	2671.63212	Not Significant
(3, 0, 3)	(2, 0, 0, 30)	3884.30503	3917.13706	[0.43145282 -0.77060014 0.45426162]	[-0.08370236 0.80133856 -0.20971107]	3226.02805	Not Significant
(3, 0, 4)	(2, 0, 1, 30)	3884.31761	3923.71605	[0.34652013 0.34995956 -0.73997659]	[-0.01722411 -0.38144212 0.69859661 0.30887004]	3278.53372	Not Significant
(4, 0, 2)	(1, 0, 2, 30)	3884.57187	3920.68712	[-0.16097628 -0.63004415 0.25580339 -0.01564094]	[0.48481394 0.81612592]	2909.92767	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 2)	(2, 0, 2, 30)	3884.57813	3920.69337	[-0.15572986 -0.63528651 0.2616846]	[0.47556718 0.82778386]	2886.11542	Not Significant
(3, 0, 3)	(2, 0, 1, 30)	3884.64179	3920.75704	[-0.25949798 -0.66549565 0.18821674]	[0.58426664 0.8740402 0.08669245]	3226.02726	Not Significant
(3, 0, 5)	(2, 0, 0, 30)	3885.37551	3924.77395	[0.26808764 0.35911157 -0.78223597]	[0.05961822 -0.30299413 0.73522185 0.27771763 0.12526407]	4305.39863	Not Significant
(5, 0, 2)	(1, 0, 2, 30)	3885.83329	3925.23174	[-0.07407907 -0.65944135 0.29090786 -0.00762058 0.07121592]	[0.40371865 0.80247751]	2909.92677	Not Significant
(3, 0, 5)	(2, 0, 1, 30)	3889.6475	3932.32915	[-0.7353797 -0.05726725 -0.16422667]	[1.02818729 0.34258399 0.29513491 0.12260692 -0.00327394]	4305.39333	Not Significant
(2, 0, 4)	(2, 0, 1, 30)	3895.72891	3931.89985	[-1.61995136 -0.67425713]	[1.9939355 1.34146301 0.48258956 0.195569]	3255.97899	Not Significant
(2, 0, 0)	(2, 0, 0, 30)	3897.08853	3916.81813	[0.33331294 0.00803327]		2813.45567	Not Significant
(2, 0, 1)	(2, 0, 0, 30)	3897.78416	3920.80203	[0.18577562 0.08942221]	[0.16304078]	2671.63274	Not Significant
(1, 0, 1)	(1, 0, 2, 30)	3898.34858	3921.36645	[0.41931917]	[-0.05977617]	2716.50167	Not Significant
(2, 0, 1)	(2, 0, 1, 30)	3898.4287	3924.73484	[-0.41310082 0.25021306]	[0.74885866]	2671.63176	Not Significant
(2, 0, 0)	(2, 0, 1, 30)	3898.4899	3921.50777	[0.34793549 0.02922073]		2813.45533	Not Significant
(2, 0, 1)	(1, 0, 2, 30)	3898.62489	3924.93103	[-0.39112199 0.24312391]	[0.7301753]	2671.63175	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 2)	(2, 0, 0, 30)	3899.21569	3925.52183	[-0.00511074 0.24899533]	[0.35605223 -0.10550462]	2761.90063	Not Significant
(1, 0, 1)	(2, 0, 2, 30)	3899.91875	3926.22488	[0.61846749]	[-0.27235976]	2716.50026	Not Significant
(2, 0, 2)	(2, 0, 1, 30)	3900.10944	3929.70385	[-0.44695034 0.26305276]	[0.78220182 0.00265544]	2761.89943	Not Significant
(2, 0, 1)	(2, 0, 2, 30)	3900.27132	3929.86572	[-0.52733591 0.30545182]	[0.85679312]	2671.63088	Not Significant
(2, 0, 0)	(2, 0, 2, 30)	3900.35741	3926.66354	[0.35433277 0.03532927]		2813.45533	Not Significant
(3, 0, 1)	(1, 0, 2, 30)	3900.39369	3929.98809	[-0.3165047 0.22238138 0.0413117]	[0.6511749]	2671.63234	Not Significant
(2, 0, 3)	(2, 0, 0, 30)	3901.05292	3930.64732	[0.02649759 0.12835756]	[0.32134712 0.00859923 0.0511965]	3071.92526	Not Significant
(2, 0, 3)	(2, 0, 1, 30)	3901.1491	3934.03177	[-0.50182973 -0.19733536]	[0.82556733 0.46541733 0.16177567]	3071.92484	Not Significant
(4, 0, 1)	(1, 0, 2, 30)	3902.45739	3935.34006	[-0.24756677 0.20573 0.03990095 -0.02962889]	[0.58411917]	2757.29753	Not Significant
(2, 0, 5)	(2, 0, 0, 30)	3903.14092	3939.31185	[0.33134697 -0.45115593]	[0.02033491 0.49575837 0.22042581 0.09733236 0.14890225]	4316.31732	Not Significant
(2, 0, 4)	(2, 0, 0, 30)	3903.29527	3936.17794	[-0.38722345 0.45611416]	[0.74384003 -0.18231911 0.01136959 0.08172359]	3255.98062	Not Significant
(5, 0, 1)	(1, 0, 2, 30)	3903.52223	3939.69316	[-0.52484271 0.29936111 0.04739465 -0.01227425 -0.08307106]	[0.85601131]	2791.85725	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(2, 0, 5)	(2, 0, 1, 30)	3904.19183	3943.65103	[-0.03704787 -0.70537295]	[0.37272616 0.85070134 0.32900646 0.10630705 0.1300283]	4316.31634	Not Significant
(1, 0, 0)	(2, 0, 0, 30)	3913.75994	3930.22647	[0.33754597]		2769.0919	Not Significant
(1, 0, 1)	(2, 0, 0, 30)	3915.30315	3935.06298	[0.30495208]	[0.04638943]	2716.50237	Not Significant
(1, 0, 0)	(1, 0, 2, 30)	3915.40056	3935.16039	[0.36442311]		2769.09162	Not Significant
(1, 0, 0)	(2, 0, 1, 30)	3915.41583	3935.17566	[0.35510495]		2769.09172	Not Significant
(1, 0, 2)	(2, 0, 0, 30)	3916.41805	3939.47119	[0.26607268]	[0.07687539 0.06034604]	2737.60014	Not Significant
(2, 0, 0)	(1, 0, 2, 30)	3917.16745	3940.22059	[0.35154573 0.03730059]		2813.4552	Not Significant
(1, 0, 1)	(2, 0, 1, 30)	3917.24324	3940.29637	[0.3542317]	[0.00015053]	2716.50203	Not Significant
(1, 0, 0)	(2, 0, 2, 30)	3917.36874	3940.42187	[0.35913293]		2769.09151	Not Significant
(1, 0, 3)	(2, 0, 0, 30)	3917.85344	3944.19988	[0.14983876]	[0.19457319 0.09038635 0.07023204]	3079.5172	Not Significant
(1, 0, 2)	(2, 0, 1, 30)	3918.15944	3944.50588	[0.03071348]	[0.29714482 0.1098187]	2737.59958	Not Significant
(1, 0, 3)	(2, 0, 1, 30)	3918.23545	3947.8752	[-0.38614846]	[0.71388988 0.24687694 0.10641994]	3079.5168	Not Significant
(1, 0, 4)	(2, 0, 1, 30)	3918.61102	3951.54407	[-0.91178653]	[1.26281438 0.38532014 0.2064129 0.1831709]	3289.1692	Not Significant
(3, 0, 0)	(1, 0, 2, 30)	3918.90086	3945.2473	[0.35104733 0.03061896 0.0162466]		2671.63256	Not Significant
(1, 0, 4)	(2, 0, 0, 30)	3920.06295	3949.70269	[0.08906348]	[0.25497633 0.11075431 0.07639877 0.00160651]	3289.17095	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 0)	(1, 0, 2, 30)	3920.59031	3950.23005	[0.34935402 0.03183952 0.0348467 -0.04661311]		2757.29771	Not Significant
(1, 0, 5)	(2, 0, 0, 30)	3921.48401	3954.41706	[-0.14023252]	[0.48694655 0.21355598 0.13198775 0.06833613 0.07711992]	4417.03316	Not Significant
(5, 0, 0)	(1, 0, 2, 30)	3922.64465	3955.5777	[0.34915747 0.03280808 0.03453391 -0.04302161 -0.00837251]		2791.85848	Not Significant
(1, 0, 5)	(2, 0, 1, 30)	3923.3957	3959.62206	[-0.28966914]	[0.63226193 0.25354427 0.14424444 0.06634638 0.05772208]	4417.03307	Not Significant
(5, 0, 5)	(1, 0, 1, 30)	4399.0194	4446.78245	[-0.0172041 0.55857196 -0.62924499 -0.53684637 0.46277449]	[0.43158341 -0.43485414 0.59049737 0.85882289 -0.16345163]	4427.5323	Not Significant
(4, 0, 5)	(1, 0, 1, 30)	4402.04659	4446.39799	[0.28020676 0.33394264 0.3459984 -0.77759136]	[0.09849916 -0.25939544 -0.44746171 0.65590999 0.25390038]	4224.6546	Not Significant
(1, 0, 5)	(1, 0, 1, 30)	4402.38492	4436.50138	[0.02005966]	[0.35028136 0.20806446 0.11731825 0.08961661 0.08963781]	4417.03282	Not Significant
(2, 0, 5)	(1, 0, 1, 30)	4402.99161	4440.51972	[0.57870135 -0.47413262]	[-0.20337886 0.46894446 0.17703527 0.12836961 0.12340802]	4316.31693	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 5)	(1, 0, 1, 30)	4403.51767	4444.45742	[0.22746494 0.33938387 -0.76586271]	[0.11231028 -0.22639073 0.70958667 0.27243199 0.1892735]	4305.3989	Not Significant
(5, 0, 4)	(1, 0, 1, 30)	4414.11038	4458.51969	[-0.02673057 0.70564566 -0.4978214 -0.77645016 0.26351289]	[0.42479286 -0.62469702 0.37566576 0.97265819]	3733.71233	Not Significant
(5, 0, 4)	(1, 0, 0, 30)	4414.90138	4455.89459	[-0.11123314 0.92742913 -0.15078208 -0.66362138 0.13804817]	[0.52206718 -0.74839001 -0.02001265 0.70017666]	3733.71258	Not Significant
(5, 0, 5)	(1, 0, 0, 30)	4417.34893	4461.75823	[0.04332965 0.60185097 -0.66354691 -0.51508603 0.50462381]	[0.34948539 -0.46979396 0.6578534 0.84892282 -0.21077619]	4427.53298	Not Significant
(5, 0, 0)	(1, 0, 0, 30)	4419.71467	4447.04347	[0.35811588 0.05356834 0.0028087 -0.01481624 -0.04639771]		2791.85891	Not Significant
(1, 0, 4)	(1, 0, 1, 30)	4419.86533	4450.61024	[-0.06667743]	[0.4254308 0.20355317 0.10119063 0.03263203]	3289.17071	Not Significant
(3, 0, 4)	(1, 0, 1, 30)	4420.88354	4458.46065	[0.40082059 0.35989596 -0.71285447]	[-0.06598736 -0.37456217 0.64972421 0.28381082]	3278.53407	Not Significant
(2, 0, 4)	(1, 0, 1, 30)	4421.01335	4455.17436	[-0.50780423 0.29456138]	[0.86737371 0.05759576 0.09480579 0.08718968]	3255.98012	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(5, 0, 0)	(1, 0, 1, 30)	4421.42099	4452.16589	[0.36959813 0.06197104 0.00590177 -0.00720705 -0.03673467]		2791.85833	Not Significant
(5, 0, 1)	(1, 0, 0, 30)	4421.44635	4452.19125	[0.2119692 0.12167201 0.01794259 -0.01204596 -0.01972813]	[0.15827135]	2791.85897	Not Significant
(5, 0, 2)	(1, 0, 0, 30)	4422.19024	4456.35125	[0.66716999 -0.60835757 0.17877895 0.07488289 -0.018284]	[-0.29350483 0.55901213]	2909.92913	Not Significant
(5, 0, 3)	(1, 0, 0, 30)	4422.62887	4460.20598	[0.47652641 0.0339678 -0.72015653 0.31949 0.00995355]	[-0.11161075 -0.03018595 0.70799776]	3759.74096	Not Significant
(5, 0, 1)	(1, 0, 1, 30)	4422.69503	4456.85603	[-0.43854396 0.33960562 0.05957581 -0.0004726 -0.05391656]	[0.79338135]	2791.85778	Not Significant
(5, 0, 3)	(1, 0, 1, 30)	4423.24736	4464.24056	[0.66356176 0.15076079 -0.92244979 0.34962674 0.00622634]	[-0.30914176 -0.21712184 0.88028484]	3759.74032	Not Significant
(5, 0, 2)	(1, 0, 1, 30)	4424.111	4461.6881	[0.09478531 -0.242307 0.15896407 0.02421792 0.03404062]	[0.27005318 0.39921184]	2909.9286	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 4)	(1, 0, 1, 30)	4424.88992	4465.88313	[0.0028895 -0.11044438 -0.45113221 0.29962296]	[0.35647154 0.28913463 0.55871654 -0.049559]	3465.47642	Not Significant
(4, 0, 5)	(1, 0, 0, 30)	4436.56099	4477.60741	[0.06214943 0.20921772 0.34879373 -0.63461898]	[0.31976458 -0.0205952 -0.33741105 0.55695957 0.21115655]	4224.65456	Not Significant
(1, 0, 3)	(1, 0, 1, 30)	4437.23055	4464.59483	[-0.05618911]	[0.41335554 0.19841998 0.0767624]	3079.51698	Not Significant
(4, 0, 0)	(1, 0, 0, 30)	4437.33359	4461.27733	[0.35716221 0.05555596 -0.00923371 -0.0395794]		2757.29805	Not Significant
(4, 0, 1)	(1, 0, 0, 30)	4438.80971	4466.17399	[0.1945875 0.13350023 0.01041917 -0.02018282]	[0.17730735]	2757.29813	Not Significant
(4, 0, 0)	(1, 0, 1, 30)	4438.94471	4466.30899	[0.37055325 0.06578652 -0.00471123 -0.02571195]		2757.2974	Not Significant
(2, 0, 3)	(1, 0, 1, 30)	4438.9462	4469.73101	[-0.21712442 0.20615073]	[0.57758879 0.06280141 0.04625752]	3071.92487	Not Significant
(4, 0, 4)	(1, 0, 0, 30)	4439.24384	4476.86973	[0.5967172 0.16533727 -0.81919923 0.22384569]	[-0.24307417 -0.22051544 0.76745084 0.12073758]	3465.4762	Not Significant
(4, 0, 2)	(1, 0, 0, 30)	4439.59994	4470.38476	[0.62423075 -0.60072862 0.18749756 0.06951785]	[-0.25051798 0.56896548]	2909.92803	Not Significant
(3, 0, 3)	(1, 0, 1, 30)	4439.70006	4473.90541	[0.46731105 -0.81190361 0.56916441]	[-0.09564789 0.87858511 -0.28249233]	3226.02808	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(4, 0, 3)	(1, 0, 0, 30)	4439.82772	4474.03307	[0.49189189 0.01845441 -0.72697228 0.32872818]	[-0.12296625 -0.0233234 0.71306091]	3731.4602	Not Significant
(4, 0, 1)	(1, 0, 1, 30)	4440.47492	4471.25974	[-0.15116832 0.24481789 0.02728179 -0.02003679]	[0.51107287]	2757.29752	Not Significant
(4, 0, 2)	(1, 0, 1, 30)	4441.33161	4475.53696	[0.42680905 -0.68782127 0.23948809 0.07991412]	[-0.06254183 0.72685393]	2909.92826	Not Significant
(4, 0, 3)	(1, 0, 1, 30)	4441.80506	4479.43094	[0.49189626 0.04415969 -0.71122272 0.32051184]	[-0.12334495 -0.04672941 0.69204797]	3731.46011	Not Significant
(3, 0, 0)	(1, 0, 0, 30)	4454.01274	4474.56244	[0.35781951 0.05240043 -0.0253126]		2671.63287	Not Significant
(1, 0, 2)	(1, 0, 1, 30)	4454.83483	4478.80948	[0.35293913]	[0.01877513 0.07290867]	2737.59969	Not Significant
(3, 0, 1)	(1, 0, 0, 30)	4455.51941	4479.49406	[0.21033861 0.12469087 0.00436012]	[0.16191336]	2671.63301	Not Significant
(3, 0, 0)	(1, 0, 1, 30)	4455.64663	4479.62128	[0.37132459 0.06354977 -0.01487178]		2671.63239	Not Significant
(2, 0, 2)	(1, 0, 1, 30)	4456.25762	4483.65722	[-0.34582034 0.38547772]	[0.70469452 -0.06875289]	2761.89944	Not Significant
(3, 0, 3)	(1, 0, 0, 30)	4456.4421	4487.26665	[0.44123757 -0.80814094 0.53963455]	[-0.07061692 0.87472388 -0.25360396]	3226.02798	Not Significant
(3, 0, 2)	(1, 0, 0, 30)	4456.52857	4483.92817	[0.19523865 0.05603916 0.03429992]	[0.1767866 0.07579962]	2886.11683	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(3, 0, 4)	(1, 0, 0, 30)	4456.74501	4490.99451	[0.39746913 0.4292447 -0.63043868]	[-0.04277471 -0.40982354 0.54259031 0.23400846]	3278.53473	Not Significant
(3, 0, 1)	(1, 0, 1, 30)	4457.13457	4484.53417	[-0.20953427 0.26108249 0.03326484]	[0.56807441]	2671.63227	Not Significant
(3, 0, 5)	(1, 0, 0, 30)	4457.7074	4495.38185	[0.25813605 0.39407111 -0.74219734]	[0.09398472 -0.28060717 0.67138917 0.25210459 0.16716267]	4305.3993	Not Significant
(3, 0, 2)	(1, 0, 1, 30)	4458.02514	4488.84969	[-0.28430239 0.08557101 0.11848587]	[0.64053533 0.20366183]	2886.11651	Not Significant
(2, 0, 0)	(1, 0, 0, 30)	4472.41832	4489.56505	[0.3397092 0.02825211]		2813.45566	Not Significant
(2, 0, 1)	(1, 0, 0, 30)	4472.91175	4493.48783	[0.20648312 0.1193485]	[0.1567818]	2671.63275	Not Significant
(2, 0, 0)	(1, 0, 1, 30)	4473.53628	4494.11236	[0.36094935 0.05231672]		2813.45504	Not Significant
(1, 0, 1)	(1, 0, 1, 30)	4473.63582	4494.2119	[0.44261015]	[-0.06967645]	2716.50185	Not Significant
(2, 0, 2)	(1, 0, 0, 30)	4474.04423	4498.04964	[0.17260569 0.13111637]	[0.19078035 0.00049183]	2761.90085	Not Significant
(2, 0, 1)	(1, 0, 1, 30)	4474.6688	4498.67422	[-0.0254987 0.1867414]	[0.37992752]	2671.63235	Not Significant
(2, 0, 3)	(1, 0, 0, 30)	4475.16196	4502.59672	[0.09662423 0.12750678]	[0.26654557 0.03286953 0.02825988]	3071.92529	Not Significant
(2, 0, 4)	(1, 0, 0, 30)	4476.92511	4507.78922	[-0.32371488 0.47061848]	[0.69248616 -0.15863432 -0.00601489 0.03338625]	3255.98058	Not Significant
(2, 0, 5)	(1, 0, 0, 30)	4477.86989	4512.16335	[-0.47238643 0.36607631]	[0.8469702 -0.01838451 0.04349652 0.0135109 -0.06208415]	4316.31722	Not Significant

ARIMA	Season	AIC	BIC	AR parameter	MA parameter	Intercept	Significant?
(1, 0, 0)	(1, 0, 0, 30)	4491.36452	4505.09941	[0.36800737]		2769.09191	Not Significant
(1, 0, 0)	(1, 0, 1, 30)	4492.94493	4510.11354	[0.39191386]		2769.09149	Not Significant
(1, 0, 1)	(1, 0, 0, 30)	4492.99267	4510.16128	[0.36569564]	[0.01115771]	2716.50242	Not Significant
(1, 0, 2)	(1, 0, 0, 30)	4493.21753	4513.81986	[0.32547887]	[0.0427635 0.07524116]	2737.60017	Not Significant
(1, 0, 3)	(1, 0, 0, 30)	4494.41379	4518.44984	[0.23704147]	[0.13086681 0.10399811 0.0477421]	3079.51723	Not Significant
(1, 0, 4)	(1, 0, 0, 30)	4496.09909	4523.56886	[0.1852355]	[0.17987362 0.12543681 0.07110848 0.04574641]	3289.17099	Not Significant
(1, 0, 5)	(1, 0, 0, 30)	4497.4362	4528.3397	[-0.07286723]	[0.43776174 0.2342355 0.13329855 0.09934395 0.07846921]	4417.03322	Not Significant

CURRICULUM VITAE

NAME	Ms. Napatsorn Pitakkotchakorn
Date of Birth	24 July 1995
EDUCATIONAL RECORDS	
HIGH SCHOOL	High School Graduation Mahapruttaram Girls' School under the Royal Patronage of her Majesty the Queen, 2013
BACHELOR'S DEGREE	Bachelor of Engineering (Computer Engineering) King Mongkut's University of Technology Thonburi, 2017
MASTER'S DEGREE	Master of Engineering (Computer Engineering) King Mongkut's University of Technology Thonburi, 2020
SCHOLARSHIP / RESEARCH GRANT	Research Grant for Graduate Student Big Data Experience Center Scholarship, 2018
PUBLICATION	Pitakkotchakorn, N., Barroso, V.C. and Siripongwutikorn, P., 2021, "Log Data Traffic Characterization for Packet Loss Estimation in ALICE O2 System", **2021 18th International Conference on Electrical Engineering/ Electronics, Computer, Telecommunications and Information Technology (ECTI-CON)**, 19-22 May, Chiang Mai, Thailand, pp. 94-97.