3. Dama_JUPIKOM_Mardiyan Dama.docx

by Min Seo

Submission date: 23-Feb-2026 08:02PM (UTC+0900)
Submission ID: 2884464334
File name: 3._Dama_JUPIKOM_Mardiyan_Dama.docx (104.54K)
Word count: 3893
Character count: 23801

Jurnal Publikasi Ilmu Komputer dan Multimedia

E-ISSN: 2808-8999
P-ISSN: 2808-9375

(Artikel Penelitian/ Ulasan)

A Comparative Study of File Transfer Speeds in Broadcast Industry Settings Using FTP and Alternative Network Protocols

Mardiyan Dama[1], Junindo Abdillah[2], Silviana Windasari[3]*, Abdurohman[4]

[1,3*] **Department of Electrical Engineering, Faculty of Engineering,Universitas Sains Indonesia, Indonesia**
[2] **Department of Electrical Engineering, Faculty of Engineering, Bung Karno University, Jakarta, Indonesia**
[4] **Graduate School of Electrical Engineering, School of Bioscience, Technology and Innovation (SBTI), Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia**

mardiyan.dama@lecturer.sains.ac.id[1], junindoabdillah@ubk.ac.id[2], silviana.windasari@lecturer.sains.ac.id[3*], ang.abdurohman@gmail.com[4]
***Penulis** : silviana.windasari@lecturer.sains.ac.id*

Abstract: The broadcast industry has shifted from magnetic tape–based systems to file-based workflows. This transition requires the transfer of large files across networks at high speed. However, many broadcast environments still rely on File Transfer Protocol (FTP) and Common Internet File System (CIFS), which often fail to fully utilize available network capacity. As an alternative, the Fast And Secure Protocol (FASP) was specifically developed for high-speed data transfer over networks with latency and packet loss. This study analyzes and compares file transfer performance using FTP, CIFS, and FASP through experimental testing on a local network with large files. The observed parameters include transfer time and average throughput. The results indicate that FASP delivers higher and more stable transfer performance compared to FTP and CIFS under identical network conditions. These findings are expected to serve as a reference for the broadcast industry in selecting more efficient file transfer protocols to support production workflows and content distribution.

Keywords: Broadcast industry; File transfer; FTP; CIFS; FASP; Throughput.

Diterima: tanggal
Direvisi: tanggal
Diterima: tanggal
Diterbitkan: tanggal
Versi sekarang: tanggal

1. Introduction

The development of technology in the broadcast industry has undergone a significant transformation from magnetic tape–based systems to file-based (Gomez-Barquero et al., 2022; Ibrahim et al., 2024; Makalesi & Article, 2022; Um & Dtv, n.d.). This shift has driven an increasing demand for large-scale file transfers of broadcast materials, such as high-definition (HD), ultra-high-definition (UHD), and even 4K and 8K video content, which must be moved quickly and reliably across production, post-production, and distribution systems. File transfer speed and stability have become critical factors in maintaining workflow efficiency and ensuring timely content delivery.In practice, many broadcast industry environments still rely on File Transfer Protocol (FTP) and Common Internet File System (CIFS) for data exchange. FTP is a long-established protocol that is relatively easy to implement, but it often fails to fully utilize network capacity, particularly in high-bandwidth and latency-sensitive networks (Arifuzzaman et al., 2023; Bi et al., 2025; Gartner et al., 2023). Meanwhile, CIFS, commonly used in centralized storage systems and network-attached storage (NAS) within broadcast environments (Kurniawan, 2024; Salke et al., 2023; Smb & Singh, 2025; Yang, n.d.), tends to introduce protocol overhead that can affect transfer performance when handling large files and simultaneous access by multiple users.As efficiency demands continue to rise, the Fast And Secure Protocol (FASP) has increasingly been adopted in the media and broadcast

industry due to its ability to achieve high-speed data transfers by leveraging UDP-based control mechanisms (Barovih, 2023; Gamess & Hester, 2025; Salke et al., 2023; Yang, n.d.). However, implementing FASP requires greater investment and technical expertise compared to conventional protocols. Therefore, a comparative analysis of file transfer speeds using FTP, CIFS, and FASP in broadcast industry environments is necessary to provide an objective overview of each protocol's performance, serving as a basis for decision-making in selecting the most suitable data transfer technology.

2. Theoretical Review

2.1. File Transfer within Broadcast Environments

Digital file transfer is the process of transmitting data from one system to another over a network. File transfer protocols define how data is packaged, transmitted, acknowledged, and verified upon arrival at its destination. In the broadcast industry, file transfers typically involve very large file sizes (such as HD, 4K, or 8K video), requiring protocols with high efficiency in bandwidth utilization and tolerance to network conditions such as latency and packet loss (Arifuzzaman et al., 2023; Gamess & Hester, 2025; Kawamoto & Kurakake, 2021; Kim et al., 2022; Michel et al., 2023; Nazarov & Arslan, 2022).

Transfer speed and reliability are crucial as they are directly related to the smoothness of broadcast workflows. Obstacles in the transfer process can lead to delays in content processing, postponed airing, or even disruption in the synchronization of broadcast material and advertisements. This aligns with the study Single Tone Trigger Implementation for Seamless and Automated Broadcast to Ad Insertion, which emphasizes the need for automation and accuracy in broadcasting processes, including the delivery and integration of broadcast material for seamless content transitions without human-induced delays. The study demonstrates that technical innovations reducing operational delays have a positive impact on overall broadcast efficiency, as smooth automation can minimize latency within broadcast system workflows (Dama et al., 2025; Sharma et al., 2024).

2.2 FTP Protocol (File Transfer Protocol)

FTP is one of the oldest protocols commonly used for file transfers between servers and clients over TCP/IP networks. FTP operates on a client–server model and explicitly enables file upload and download operations. Although it remains widely used due to its simplicity, FTP has performance limitations, particularly in high-latency networks, as fundamental TCP mechanisms such as slow start and congestion control hinder full bandwidth utilization during large file transfers. Several studies indicate that TCP-based protocols like FTP often fall short of actual network capacity, especially under unfavorable network conditions.

In the broadcast context, FTP is still frequently employed for content transfer because of its simplicity and compatibility with nearly all devices. However, FTP was not specifically designed for transferring very large files or for networks with high Round Trip Time (RTT), resulting in actual throughput that is typically far below the theoretical network limit (Arifuzzaman et al., 2023; Arifuzzaman & Arslan, 2021; Kurose & Ross, 2010).

2.3 CIFS Protocol (Common Internet File System)

CIFS is a file-sharing protocol that enables file access over local networks, typically through the implementation of Server Message Block (SMB). CIFS is widely used in Windows-based environments for centralized file access or shared storage. However, CIFS is not a pure file transfer protocol like FTP; rather, it is a file-sharing protocol that operates on top of TCP/IP. In practice, high protocol overhead and "chatty" communication (numerous small control messages) lead to performance degradation, particularly when transferring large files across networks with a high number of round trips. A BBC study indicates that CIFS/SMB performance can be significantly poor in networks with higher latency or longer

distances compared to optimized protocols (Borer, 2007; Mitrović & Tadić, 2025; Server, 2025; Smb & Singh, 2025).

2.4 FASP Protocol (Fast And Secure Protocol)

FASP, developed within IBM Aspera products, is designed to overcome the limitations of traditional protocols such as FTP and CIFS. FASP leverages UDP as its transport foundation, thereby avoiding the congestion control bottlenecks inherent in TCP. It also incorporates adaptive mechanisms to maximize available bandwidth utilization without compromising connection stability. This makes it an ideal choice for transferring large data sets, such as broadcast video, over long distances or across complex network segments. Technical literature supports that FASP can significantly enhance bandwidth utilization compared to other TCP-based protocols, even under less-than-ideal network conditions (Taha & Ali, 2023).

2.5 Comparative Study of Transfer Protocols

Various studies have evaluated the performance of data transfer protocols. Several investigations outside the broadcast context indicate that protocols leveraging UDP or optimized TCP can achieve significantly higher throughput compared to standard FTP, particularly for large data transfers over high-speed wide area networks (WAN). Transfer protocols such as UDT, which are built on UDP, demonstrate far superior transfer capabilities on high-capacity links, as they avoid the overly conservative congestion control mechanisms of TCP (Arifuzzaman et al., 2023; Kempf et al., 2024).

2.6 Relevance to Broadcast Workflow

The theoretical review indicates that the choice of file transfer protocol greatly influences workflow efficiency in modern broadcast systems. The adoption of solutions such as FASP is not solely about speed, but also about adaptability to diverse network conditions, decentralized content distribution models, and the real-time or near-real-time requirements of program broadcasting.

3. Method

3.1. Research Type and Approach

This study employs an experimental research method with a quantitative approach. The experimental method was chosen because the research aims to measure and compare the performance of several file transfer protocols based on directly measurable parameters, namely transfer duration and download speed. The quantitative approach is used to obtain numerical data that can be analyzed objectively and systematically.

3.2. Research Object and Environment

The object of this study is the file transfer process of broadcast media materials using three network protocols, namely File Transfer Protocol (FTP), Common Internet File System (CIFS), and Fast And Secure Protocol (FASP). The experiments were conducted in a local area network environment that represents typical conditions in the broadcast industry, where storage servers and production workstations are interconnected through an Ethernet-based network.

The testing environment was designed so that each protocol was evaluated under identical network conditions, ensuring that the measurement results could be compared fairly and objectively.

3.3. Research Equipment

The experimental hardware testbed was designed to reflect a practical broadcast file-transfer workflow, consisting of one storage server as the centralized repository and one client workstation as the production endpoint. Both systems were interconnected through a Gigabit Ethernet network switch using UTP cabling as the transmission medium, ensuring a stable, standardized LAN environment where protocol-level performance differences could be observed without confounding variations in physical connectivity.

On the software side, the evaluation compared three representative transfer approaches commonly found in broadcast operations and high-speed alternatives: an FTP server and FTP client for legacy file exchange, CIFS/SMB via a network shared folder for shared-storage style transfers, and a FASP-based file transfer application engineered for high-throughput delivery. All transfers were executed under a network operating system environment, and transfer duration was captured consistently using either a stopwatch or an automated system-based time-recording tool, enabling measurement of transfer time and derivation of average throughput under identical conditions.

3.4. Research Variables

In this study, the independent variable is the type of file transfer protocol used, namely FTP, CIFS/SMB, and FASP, which is deliberately varied to observe its impact on transfer performance. The dependent variables are the measured outcomes of each transfer session: file transfer duration (in seconds) and transfer speed/throughput (reported in MB/s or Mbps) computed from file size over transfer time.

To ensure a fair and reproducible comparison, several control variables are held constant across all trials, including the size of the transferred file, the network conditions (same LAN path and baseline link configuration), and the hardware and software environment (same server, client workstation, switch, cabling, operating system, and timing/recording method). This control strategy isolates protocol behavior as the primary factor driving differences in duration and throughput.

3.5. Testing Scenario

The testing was conducted by transferring a single large video file representing broadcast content. Each protocol was used to perform a file download process from the server to the client. The transfer process was repeated several times for each protocol in order to obtain more stable results and to reduce the impact of anomalies. The following Figure 1 depicts the complete testing scenario.

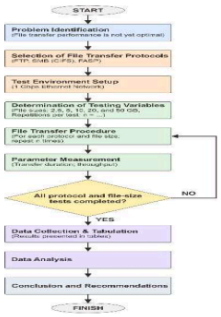

Figure 1. Research Methodology Flowchart

3.6. Data Collection Procedure

Data were collected through a controlled experimental sequence designed to ensure comparability across protocols. First, the test media files were prepared and stored on the designated storage server, and the client workstation was verified to access the server over the same Gigabit Ethernet network path. For each trial, a file download was executed using the FTP protocol, after which the transfer duration and average download speed/throughput were recorded using the selected timing and measurement method. The identical procedure was then repeated using CIFS/SMB via a shared network folder, and subsequently repeated again using the FASP-based transfer application. To improve reliability and reduce random effects, the experiment was conducted in multiple repetitions for each protocol under unchanged file size, network conditions, and hardware/software settings, and all measurements were logged for later comparison and analysis.

3.7. Parameters and Measurement Techniques

The main parameters measured in this study are transfer duration and transfer speed (throughput): transfer duration is defined as the elapsed time from the initiation of the download process until the file is completely received at the destination, while transfer speed is calculated as the ratio between the transferred file size and the measured transfer duration, and is reported in MB/s or Mbps for consistent comparison across protocols.

The transfer speed is calculated using the following Equation 1.

$$Transfer\ Speed = \frac{(File\ Size)}{(Transfer\ Duration)} \quad (1)$$

3.8. Data Analysis Techniques

The collected measurements were analyzed by computing the mean transfer duration and mean download speed/throughput for each protocol (FTP, CIFS/SMB, and FASP) across repeated trials. The results were then summarized in tables and visualized using comparative graphs to highlight differences and variability. Finally, protocol performance was compared under identical conditions to identify the most efficient option for supporting large-file movement in broadcast industry workflows.

4. Result And Analysis

4.1 . File Transfer Test Results

The testing was conducted by downloading broadcast media files using three different protocols: FTP, CIFS, and FASP, over a 1 Gbps Ethernet network. The test files consisted of five sizes: 2.5 GB, 5 GB, 10 GB, 20 GB, and 50 GB, to observe the consistency of each protocol's performance across varying file sizes. The following Table 1 presents the measured download speeds and transfer durations.

Tabel 1. File Transfer Test Results and Estimates.

No.	File Size	Protocol	Application	Speed (MB/s)	Duration (s)	Transfer Medium
1	2,5 GB	FTP	FileZilla Client	34	66	Ethernet 1 Gbps
	5 GB	FTP	FileZilla Client	41	114	Ethernet 1 Gbps
	10 GB	FTP	FileZilla Client	38	269	Ethernet 1 Gbps
	20 GB	FTP	FileZilla Client	38	539	Ethernet 1 Gbps
	50 GB	FTP	FileZilla Client	38	1.347	Ethernet 1 Gbps

No.	File Size	Protocol	Application	Speed (MB/s)	Duration (s)	Transfer Medium
2	2,5 GB	CIFS	Windows Explorer	108	22	Ethernet 1 Gbps
	5 GB	CIFS	Windows Explorer	108	44	Ethernet 1 Gbps
	10 GB	CIFS	Windows Explorer	108	95	Ethernet 1 Gbps
	20 GB	CIFS	Windows Explorer	108	190	Ethernet 1 Gbps
	50 GB	CIFS	Windows Explorer	108	474	Ethernet 1 Gbps
3	2,5 GB	FASP	Aspera Client	30	83	Ethernet 1 Gbps
	5 GB	FASP	Aspera Client	35	139	Ethernet 1 Gbps
	10 GB	FASP	Aspera Client	32	320	Ethernet 1 Gbps
	20 GB	FASP	Aspera Client	32	640	Ethernet 1 Gbps
	50 GB	FASP	Aspera Client	32	1.600	Ethernet 1 Gbps

4.2 . Transfer Speed Analysis

Based on the test and estimated results, the CIFS protocol exhibited the highest and most stable transfer speeds on a 1 Gbps Ethernet network. CIFS was able to achieve an average speed of approximately 108 MB/s across all tested file sizes, approaching the maximum capacity of the network medium used. This indicates that CIFS is highly efficient in utilizing bandwidth in a stable local network environment.

The FTP protocol delivered transfer speeds at a moderate level, averaging around 34–41 MB/s. Although still widely used in broadcast material distribution systems, FTP has not been able to fully utilize network capacity, especially for large file transfers.

Meanwhile, FASP recorded relatively lower transfer speeds in local network testing, ranging from approximately 30–35 MB/s. The advantages of FASP's design were not significantly apparent under conditions without latency and packet loss, resulting in performance below CIFS and not much different from FTP. These results confirm that CIFS is the most effective protocol for file transfer in local broadcast industry networks.

4.3 . Transfer Duration Analysis

The analysis of transfer duration shows that differences in transfer speeds among protocols directly affect the time required to move broadcast materials. The CIFS protocol produced the shortest transfer durations across all tested file sizes, both in actual measurements and estimates for large files. With an average speed approaching the maximum capacity of the 1 Gbps Ethernet network, increases in file size with CIFS only caused a linear and relatively efficient increase in transfer time.

The FTP protocol exhibited longer transfer durations compared to CIFS due to its lower and less consistent transfer speeds. As file sizes increased, FTP transfer durations grew significantly, potentially reducing production workflow efficiency if used intensively.

Meanwhile, FASP produced the longest transfer durations in the local network tests. Although FASP is designed for data transfer over high-latency networks, its advantages were not apparent under stable network conditions, resulting in longer transfer times compared to FTP and CIFS. These results confirm that CIFS is most suitable for local network environments in the broadcast industry, while FTP and

FASP are more appropriate for specific scenarios according to network characteristics.

4.4 . Discussion in the Context of the Broadcast Industry

The study results indicate that the choice of file transfer protocol directly affects workflow efficiency in the broadcast industry. In file-based production environments, transfer speed and duration determine the smoothness of content ingest, editing, and distribution processes. The CIFS protocol is the most suitable for local networks as it can optimally utilize bandwidth and accelerate production workflows.

The FTP protocol can still be used for legacy systems, but it is less efficient for transferring large files commonly used in modern broadcast content production. Meanwhile, FASP is more appropriate for distributing materials between locations over wide-area networks, as its advantages are not significant in stable local network conditions. These findings emphasize that aligning the transfer protocol with network characteristics is a key factor in improving operational efficiency in the broadcast industry.

4.5 . Relevance to Automated Broadcast Workflow

File transfer efficiency directly affects the success of automated broadcast systems, as described in the study Single Tone Trigger Implementation for Seamless and Automated Broadcast to Ad Insertion. Fast and stable file transfers support broadcast automation processes, including the synchronization of program content and advertisements. Therefore, selecting a file transfer protocol that aligns with network characteristics is a crucial factor in supporting a seamless and reliable broadcast workflow.

5. Discussion

Based on the test results and comparative analysis of file transfer speeds in the broadcast industry environment using FTP, CIFS, and FASP protocols, the results show that the choice of file transfer protocol significantly affects the efficiency of file-based workflows. The CIFS protocol demonstrated the best performance on a 1 Gbps low-latency Ethernet local network, as indicated by transfer speeds approaching the network's maximum capacity and the shortest transfer durations across various file sizes. The FTP protocol showed moderately good performance but could not fully utilize network bandwidth, particularly for large file transfers. Meanwhile, the FASP protocol did not exhibit significant advantages in local network testing, as it is designed for wide-area network conditions with higher latency and packet loss.

Estimated transfers of 10 GB, 20 GB, and 50 GB files show that the differences in transfer durations between protocols increase as file size grows. This finding indicates that protocol performance scalability becomes increasingly important for handling large media files in broadcast production and distribution workflows.

6. Conclusion

The study concludes that selecting an appropriate file transfer protocol can provide significant operational time savings in the broadcast industry. CIFS is recommended for use in local network environments due to its superior performance and efficient bandwidth utilization. FTP may still be used to maintain compatibility with legacy systems, while FASP is better suited for file transfers across wide-area or unstable network conditions. Future research is recommended to conduct testing over wide-area networks and to include additional parameters such as system resource utilization and transfer stability to achieve a more comprehensive evaluation.

Referensi

Arifuzzaman, M., & Arslan, E. (2021). Online optimization of file transfers in high-speed networks. Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis. https://doi.org/10.1145/3458817.3476208

Arifuzzaman, M., Bockelman, B., Basney, J., & Arslan, E. (2023). Falcon: Fair and Efficient Online File Transfer Optimization. IEEE Transactions on Parallel and Distributed Systems, 34(8), 2265–2278. https://doi.org/10.1109/TPDS.2023.3282872

Barovih, G. (2023). Analysis of Network Attached Storage Performance with NFS Protocol in Integrated Business Start-Up. 7(3), 1299–1306.

Bi, J., Wang, L., & Guo, G. (2025). 8K Ultra HD TV broadcast system: Challenge, architecture and implementation. Digital Communications and Networks, 11(1), 172–181. https://doi.org/https://doi.org/10.1016/j.dcan.2023.06.001

Borer, T. (2007). Standardising media delivery in a file-based world. November.

Dama, M., Windasari, S., Rotib, A. A., & Frihadi, A. (2025). Single Tone Trigger Implementation for Seamless and Automated Broadcast to Ad Insertion. 5, 116–125.

Gamess, E., & Hester, G. (2025). Using a Raspberry Pi as a Network-Attached Storage Device: Performance and Limitations. Proceedings of the 2025 ACM Southeast Conference, 67–77. https://doi.org/10.1145/3696673.3723073

Gartner, M., Smith, J.-P., Frei, M., Wirz, F., Neukom, C., Hausheer, D., & Perrig, A. (2023). Hercules: High-Speed Bulk-Transfer over SCION. 2023 IFIP Networking Conference (IFIP Networking), 1–9. https://doi.org/10.23919/IFIPNetworking57963.2023.10186366

Gomez-Barquero, D., Gimenez, J. J., Muntean, G.-M., Xu, Y., & Wu, Y. (2022). IEEE Transactions on Broadcasting Special Issue on: 5G Media Production, Contribution, and Distribution. IEEE Transactions on Broadcasting, 68(2), 415–421. https://doi.org/10.1109/TBC.2022.3163818

Ibrahim, R. A., Hidayana, R. A., & Saefullah, R. (2024). Broadcasting Adaptation in the Streaming Era : Industrial Transformation in the Digital Revolution. 2(2), 53–59.

Kawamoto, J., & Kurakake, T. (2021). Diagonal XOR-Based FEC Method to Improve Burst-Loss Tolerance for 4K/8K UHDTV Transmission. IEEE Transactions on Circuits and Systems for Video Technology, 31(5), 1983–1994. https://doi.org/10.1109/TCSVT.2020.3014924

Kempf, M., Jaeger, B., Zirngibl, J., Ploch, K., & Carle, G. (2024). QUIC on the Fast Lane: Extending Performance Evaluations on High-rate Links. Computer Communications, 223, 90–100. https://doi.org/https://doi.org/10.1016/j.comcom.2024.04.038

Kim, S., Shin, S., & Moon, J. (2022). UDP-based Extremely Low Latency Streaming. 2022 IEEE 19th Annual Consumer Communications & Networking Conference (CCNC), 94–99. https://doi.org/10.1109/CCNC49033.2022.9700635

Kurniawan, A. A. (2024). Implementasi nas server menggunakan stb openwrt di balai desa gedungan sumenep ,. 3.

Kurose, J. F. ., & Ross, K. W. . (2010). Computer networking : a top-down approach. 862.

Makalesi, D.-P. T. broadcasting is, & Article, R. (2022). YENİ MEDYADA TELEVİZYON TEKNİĞİ.

Michel, F., Cohen, A., Malak, D., De Coninck, Q., Médard, M., & Bonaventure, O. (2023). FlEC: Enhancing QUIC With Application-Tailored Reliability Mechanisms. IEEE/ACM Transactions on Networking, 31(2), 606–619. https://doi.org/10.1109/TNET.2022.3195611

Mitrović, O., & Tadić, V. (2025). SMB Over QUIC: A Performance Evaluation. 2025 MIPRO 48th ICT and Electronics Convention, 919–924. https://doi.org/10.1109/MIPRO65660.2025.11132048

Nazarov, N., & Arslan, E. (2022). In-Network Caching Assisted Error Recovery For File Transfers. 2022 IEEE/ACM International Workshop on Innovating the Network for Data-Intensive Science (INDIS), 20–24. https://doi.org/10.1109/INDIS56561.2022.00008

Salke, P., Chavan, P., Sangrulkar, O., & Motade, S. N. (2023). Analyzing the Feasibiity and Realibilty of Nextcloud as a Network Attached Cloud Storage Solution on Raspberry Pi. 2023 International Conference on Integrated Intelligence and Communication Systems (ICIICS), 1–4. https://doi.org/10.1109/ICIICS59993.2023.10421037

Server, W. (2025). Análise comparativa de desempenho dos sistemas de arquivos NFS e SMB / CIFS integrados ao DFS do windows server. 7.

Sharma, U., Malviya, A., & Shree, R. (2024). Exploring The Role of Edge Computing In Optimizing Broadcast Technologies. 2024 IEEE 13th International Conference on Communication Systems and Network Technologies (CSNT), 117–126. https://doi.org/10.1109/CSNT60213.2024.10546077

Smb, B. N. F. S., & Singh, P. (2025). Workload-Driven Perspectives on Networked Filesystems : 3(4), 975–981. https://doi.org/10.61359/11.2206-2553

Taha, M., & Ali, A. (2023). applied sciences Redirection and Protocol Mechanisms in Content Delivery Network-Edge Servers for Adaptive Video Streaming.

Um, T. V, & Dtv, C. (n.d.). TV 3.0: Um Estudo sobre Core DTV+ na Nuvem. 276–281.

Yang, S. (n.d.). Advancements in Network Attached Storage (NAS) for Mobile Devices : Technological Developments and Performance Assessment Abstract : 1–7.

Yunhong Gu. (n.d.).

3. Dama_JUPIKOM_Mardiyan Dama.docx

ORIGINALITY REPORT

13%	11%	7%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Universitas 17 Agustus 1945 Semarang Student Paper	4%
2	journal.stiestekom.ac.id Internet Source	2%
3	simplebooklet.com Internet Source	1%
4	www.infoskysolutions.com Internet Source	1%
5	www.commoncriteriaportal.org Internet Source	1%
6	Christopher Negus. "Configuring an FTP Server", Wiley, 2015 Publication	<1%
7	www.mdpi.com Internet Source	<1%
8	journalstories.ai Internet Source	<1%
9	www.ijiis.org Internet Source	<1%
10	journalcenter.org Internet Source	<1%
11	linux.wareseeker.com Internet Source	<1%
12	www.webrizhosting.com Internet Source	<1%

13	patents.justia.com Internet Source	<1%
14	www.coursehero.com Internet Source	<1%
15	www.dataspaceweb.net Internet Source	<1%
16	marketintelo.com Internet Source	<1%
17	sacj.org.za Internet Source	<1%
18	international.areai.or.id Internet Source	<1%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	On		