The Telecommunication Sector in Palestine: Current Challenges and Solutions

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Abstract— **The telecommunications sector plays a crucial role in the economic development of Palestine, providing connectivity and fostering business growth. Despite the continuous development of telecommunication networks globally, Palestine has a unique situation due to the Israeli occupation, which has created many challenges for the development of the telecommunications sector. Since this sector is one of the most important investment areas, it is essential to find suitable ways to develop it and address all the problems hindering its development. This paper examines the current challenges faced by the telecommunication industry and proposes viable solutions. Provided solutions were discussed with stakeholders to examine their feasibility and implementation.**

I. Introduction

The telecommunications sector is a cornerstone of economic development, facilitating communication, trade, and access to information. In Palestine, the telecommunication industry plays a vital role in connecting communities and fostering business growth.

The evolution of telecommunications in Palestine has been significantly influenced by historical events. Prior to the Israeli occupation, the sector was relatively undeveloped. The establishment of the Palestinian Authority in the 1990s marked a pivotal moment, paving the way for the privatization of telecommunication services. Key milestones include the launch of mobile services in 1999 and the introduction of Internet services shortly thereafter. However, ongoing political tensions and restrictions have stymied growth and investment, leading to a fragmented telecommunication landscape.

The telecommunication sector faces numerous challenges stemming from political instability, regulatory hurdles, and technological limitations. This is due to the occupation and the restrictions which create a digital and economic divide.

This paper explores the current state of the telecommunication sector in Palestine, identifies key challenges, and proposes potential viable solutions to enhance its development.

II. Current State of the Telecommunication Sector

Today, the Palestinian telecommunication sector consists of several key players, including the Palestine Telecommunications Company (Paltel) and Jawwal, the first mobile operator, as well as Ooredoo. These companies dominate the market, but competition remains limited due to regulatory constraints and economic challenges. As of 2023, mobile penetration rates stand at approximately 82.5%, while fixed broadband Internet penetration lags at around 43%, highlighting disparities in access [1][2]. The technological infrastructure is often outdated, particularly in rural areas where connectivity remains sporadic.

Mobile telecommunications companies in Palestine operate using third-generation technology (3G), which is outdated and does not meet the evolving needs for communication and e-commerce. It also poses a significant barrier to digital transformation and building a robust infrastructure that contributes to the development of a digital economy, which can help improve the difficult situation in Palestine. It is well-known that the recent war, which is still ongoing, has caused immense destruction to the telecommunications sector in Gaza. The infrastructure in Gaza has been partially or completely destroyed in some areas.

Telecommunications companies have worked to improve communications in Palestine over the past few years by using fiber optic technology, which has helped enhance connectivity and business development to some extent. The companies operating in the field are still expanding their fiber networks to cover larger areas.

The ongoing war and the preceding COVID-19 pandemic have highlighted the urgent need to address the challenges facing the telecommunications sector and to propose feasible solutions aimed at improving the quality and sustainability of services.

III. Challenges Facing the Telecom Sector

A. Political and Economic Challenges

The ongoing occupation presents significant barriers to investment and development. Restrictions on movement and trade hinder the import of essential technology and equipment, stifling innovation and expansion.

Areas with low population density, such as the C Area, are still under Israeli control, telecommunications companies in Palestine have not yet had the opportunity to cover these areas, although some companies have been able to cover some of these areas through fiber optic home technology.

As a result, many residents are without communication services, and many of them are using Israeli networks.

Moreover, approvals for installing telecommunication towers in marginalized and remote areas such as the Jordan Valley and the Masafer Yatta region require prior authorization from Israeli authorities. It is worth noting that many of the tower installation requests submitted for these areas have been

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rejected, which prevents coverage in regions inhabited by Palestinian communities in need of reliable communication and Internet services. *Additionally, Palestinian companies are required to pay annual fees for investing in and installing towers in Area C, adding extra costs that are ultimately reflected in the service prices offered to the public*.

B. Technological Barriers

For a long time, Palestinian cellular networks have been operating on 3G technology, which has become outdated. This affects service quality and user experience. Access to advanced technologies, such as 4G and 5G, is not granted yet. At present, the allocation and utilization of radio frequencies remain significantly restricted by Israeli authorities. In accordance with the Oslo Accords, the approval of the Israeli Ministry of Communications is required for any Palestinian use of the radio spectrum. This requirement has resulted in prolonged delays in the release of essential frequency bands, particularly those needed for the deployment of modern mobile technologies such as 3G, 4G and 5G. *For years, there have been discussions with the Israeli side to obtain approval for at least the 4G frequencies. Till now, the required approvals have not been granted.* This shift is an urgent necessity for developing the business sector and opening up to the global market.

Therefore, the gap resulting from our lack of access to 4G and 5G frequencies will lead to a delay in the development of the telecommunications sector. A large number of Palestinian citizens will be compelled to use Israeli SIM cards due to the slow Internet speeds and the disparity in service prices. These high prices are directly linked to the technology in use, as it is possible to offer much better service packages with 4G and 5G technologies—offers that are simply not feasible with the currently available 3G in the West Bank or 2G in Gaza. This situation results in losses for Palestinian companies and negatively impacts the Palestinian economy.

C. Access and Affordability

Economic disparities exacerbate issues of access and affordability. Many households cannot afford telecommunication services, particularly in marginalized communities, further entrenching the digital divide. Given that a strong infrastructure is now considered an acceptable opportunity for the business sector, access to telecommunications and Internet services will undoubtedly create job opportunities in those areas, thus improving the national economy. The price of fixed broadband Internet is 1.73% of GNI per capital, the Arab state price is 2.99% of GNI and the worldwide the price is 2.66% of GNI (ITU, 2025).

D. Lack of backup systems

The successive wars in Palestine and the COVID-19 pandemic have demonstrated that the current infrastructure of communication networks is not equipped to operate with the required efficiency under such conditions.

Telecommunications companies struggle to provide services despite the risks to their employees and the constant damage and replacement of their equipment. This issue is one of the most urgent problems in Palestine, and it is crucial to seek creative and innovative solutions to address it.

IV. POTENTIAL SOLUTIONS

The challenges facing the telecommunication sector have far-reaching implications. Businesses struggle to compete in an increasingly digital economy due to unreliable connectivity. Consumers face barriers to accessing essential services such as education and telehealth, which are vital in today's world. Overall, these challenges hinder economic growth, limit job creation, and perpetuate social inequalities.

In this section, we will present and discuss different ideas and solutions that are expected to contribute to overcoming these challenges and contribute to developing telecommunication networks, enabling them to confront future challenges. A special focus is given to the issue of providing telecommunication services during disasters.

A. Policy and Regulatory Reforms

- **A Unified Regulatory Authority:**

  A single regulatory body to streamline policies and procedures is necessary, providing clarity and stability for telecommunication operators. This regulatory authority primarily aims to encourage investment and organize the sector in a promising way to enhance service quality and increase competitiveness among operators. The authority was established in 2023 and just start performing its duties.

  This authority is expected to contribute to better regulating the telecommunication sector, increasing competition among existing companies, and raising the quality of services provided to citizens. Furthermore, this authority plays a key role in ensuring the availability of modern, advanced telecommunications services that are ready to support digital transformation and the digital economy.

- **Incentivize Private Investment:**

  Tax breaks or subsidies for telecommunication companies investing in infrastructure development need to be adopted, particularly in underserved areas. This can contribute to encouraging operators to provide service to all Palestinian areas, creating equal opportunities for everyone to engage in freelance work and benefit from the digital world.

- **International Support for Enabling Palestinian Telecom Development:**

  Exerting pressure on the relevant parties to facilitate the access of Palestinian companies to the required frequencies and modern technologies is essential. This can be achieved through the support of the international community, Arab countries, and relevant international organizations, such as the International Telecommunication Union (ITU).

Advancing Telecommunications Rights in Palestine Through International Advocacy and Documentation.

Given the inherently political nature of the constraints facing Palestine's telecommunications sector, domestic reforms alone are insufficient. To address the persistent external restrictions—such as spectrum embargoes, delays in the importation of telecommunications equipment, and service disruptions imposed by the Israeli occupation—sustained international pressure and support are essential. This can be achieved through the support of the international community, Arab countries, and relevant international organizations, such as the International Telecommunication Union (ITU).

To systematically present these challenges on the international stage, the establishment of a dedicated advocacy entity—provisionally referred to as the "Palestinian telecommunication Rights Watch"—is proposed. This body, potentially housed within the Palestine Liberation Organization's Negotiations Affairs Department or the Telecommunications Regulatory Authority (TRA), would be responsible for monitoring, documenting, and reporting on all violations and structural impediments to the telecommunications rights of the Palestinian people.

Key areas of focus would include:

a) Spectrum allocation delays and denials (e.g., the protracted approval process for 4G services and the ongoing lack of access to 5G).

b) Restrictions on the import of telecommunications equipment, often justified under Israel's broad classification of "dual-use" items, which has led to significant delays or outright bans on networking infrastructure.

c) Incidents of intentional service disruption, such as the shutdown of Internet and mobile networks in Gaza during periods of military escalation.

d) The operation of unauthorized Israeli telecommunications providers in the West Bank, which undermines Palestinian market sovereignty and economic viability.

By compiling quantitative data, case studies, and legal documentation of these issues, Palestine can build a robust, evidence-based narrative to present at international forums.

A critical platform for such advocacy is the International Telecommunication Union (ITU), the United Nations specialized agency for ICT. Although Palestine holds only observer status (as the "State of Palestine"), it has received consistent support in the form of ITU resolutions. For instance, Resolution 125 and related declarations have called repeatedly for the development and rehabilitation of Palestine's telecommunications infrastructure and for Israel to fulfill its obligations under international agreements. Notably, in June 2024, the ITU Council adopted Resolution 1424, expressing deep concern that Gaza remains limited to 2G mobile service and that Israel continues to obstruct the deployment of 3G, 4G, and 5G technologies.

B. Infrastructure Development

- **Investment in Resilient Infrastructure:**

  Robust telecommunication infrastructure that can withstand conflicts is needed, such as underground cabling and hardened facilities. In light of the circumstances we live in, having a strong and flexible infrastructure is a pressing necessity to provide continuous communication during difficult and exceptional conditions.

- **Expanding Wireless Networks:**

  Mobile technologies (e.g., 4G and upcoming 5G) need to be utilized to improve connectivity in rural areas, reducing reliance on fixed-line infrastructure that may be vulnerable during conflicts. The table below compares between 3G, 4G, and 5G technologies [3].

Feature	3G	4G	5G
Speed	Up to 2 Mbps	10 Mbps to 1 Gbps	50 Mbps to 10 Gbps+
Latency	100-500 milliseconds	30-50 milliseconds	1 millisecond
Capacity	Up to 1,000 devices/km²	***Up to*** 2,000 devices/km²	***Up*** to 1,000,000 devices/km²
Network Architecture	Circuit-switched	Packet-switched	Flexible, with small cells and network slicing
Frequency Bands	850 MHz, 1900 MHz	Below 3 GHz	Below 1 GHz, 1-6 GHz, and above 24 GHz (mmWave)
Use Cases	Voice calls, web browsing	HD video streaming, gaming	IoT, AR/VR, smart cities
Mobility Support	Good	Excellent	Excellent
Connection Type	CDMA, UMTS	LTE, LTE Advanced	New Radio ***5G NR***

Table 1: Comparing 3G, 4G, 5G Technologies.

C. Emergency Response Plans

- **Backup Systems:**

Redundant systems are required to be implemented for power and connectivity, such as solar-powered base stations to maintain services during conflicts [4][5]. In light of the difficult circumstances facing Palestine and considering the successive wars that have led to interruptions in communication and Internet services, there is a need to establish additional backup networks. In this regard, we propose the following solutions.

1- Satellite communication networks:

Currently, the possibility of creating a communication network based on satellites through Starlink is being studied. This network could provide the necessary services in remote areas that are not adequately covered by existing cellular networks, as well as in areas classified as C. Additionally, this network can provide communications as an alternative to mobile networks without the need for ground base stations that require fuel. This service simply requires a satellite dish that can be installed on a home or institution, along with a router equipped with Wi-Fi technology and Ethernet for the internal network.

The implementation and adoption of this technology presents challenges, but these can be overcome. Some of these challenges relate to the licensing requirements for the technology, the supply of equipment, and the costs associated with its use.

Figure 1 shows the elements of a starlink connection at the user side. The system architecture (shown in figure 2) is comprised of three segments:

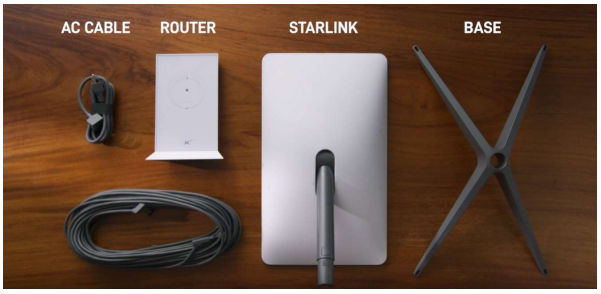

Figure 1: Starlink communication elements.

a) The ground segment, used to manage the network and provides Internet connectivity to the satellites.

b) The user segment, which includes the elements needed to access the network at the user side.

c) The space segment, which includes the set of satellites used to connect the user to the internet.

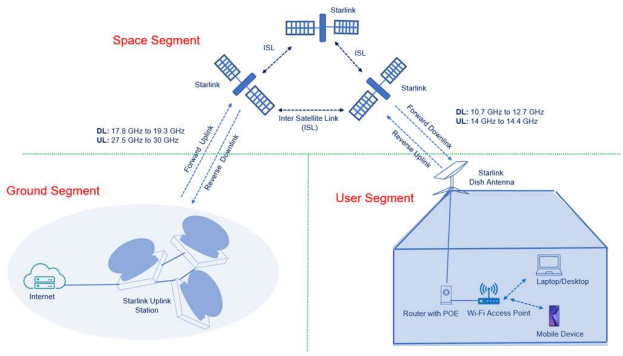

Figure 2: Starlink Segments.

2. Mobile broadband Wireless Networks:

These can be used as crisis communication strategies. Protocols and methods need to be developed for rapid deployment of mobile networks in conflict zones to ensure communication remains accessible. Current networks should be able to adopt such expansion without difficulties.

This proposal includes a number of large mobile units that can provide communication and Internet services in various areas. The units shall be capable of moving in difficult locations and broadcasting at high power to achieve reasonable coverage. This solution allows for the provision of communication services in the case of significant damage to the original mobile communication networks. It is possible to provide communication services to these units through core units in the original network or via satellites.

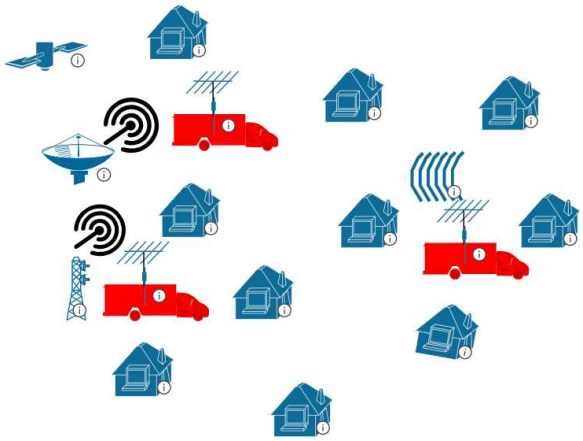

Figure 3 – Mobile broadband wireless networks.

3. Ambarella Wireless Networks:

This proposal pertains to providing high-capacity, fixed communication umbrellas with extensive coverage to offer backup communication services during disasters. These umbrellas connect to the terrestrial network or satellite networks.

4. Reconfigurable Intelligent Surfaces:

These are advanced technologies designed to enhance wireless communication systems. They consist of large arrays of passive or low-power active elements that can manipulate electromagnetic waves. They can dynamically adjust their properties based on environmental conditions, optimizing performance.

5. Free space Optical (FSO):

Free Space Optical (FSO) communication is a technology that uses light propagating in free space to transmit data wirelessly. FSO does not require frequency licenses, reducing regulatory overhead. FSO is considered to be ideal for connecting remote sites to central networks without laid fiber optics. FOS is employed in secure communications where physical infrastructure is impractical.

D. Community Engagement and Education

- **Digital Literacy Programs:**

  Initiatives are needed to be launched to educate the community on digital tools and online resources, enhancing their ability to utilize telecommunication services effectively [6]. This would enrich people with the knowledge necessary to cope with recent digital advancements.
- **Telecommunication Services for Education:** Partnerships with educational institutions are required to be created to provide affordable Internet access for students, enabling online learning and resources. The COVID-19 pandemic and the ongoing closures of Palestinian territories in recent years have revealed the need for a robust infrastructure to support e-learning. This requires high-speed communications networks capable of transmitting digital content to students and supporting high quality.

E. Public-Private Partnerships (PPPs)

- **Collaborative Projects:**

  Government should encourage partnerships between the government, private sector, and international organizations to fund and implement infrastructure projects, ensuring shared responsibility and resources.
- **Leveraging International Expertise:**

  Partnering with global telecommunication firms for knowledge transfer and technical assistance in modernizing services and technologies is crucial (e.g. Naas).

F. Sustainability Initiatives

- **Green Technology Adoption:**

  Government should encourage the use of renewable energy sources for telecommunication operations, reducing reliance on vulnerable power supplies and enhancing sustainability.

- **Community-Based Solutions:**

  Local communities shall be involved in the maintenance and management of telecommunication infrastructure, fostering a sense of ownership and resilience.

G. International Collaboration

- **Engagement with NGOs and International Organizations:**

  Government should establish collaboration with entities that specialize in crisis response and development to secure funding and expertise for enhancing telecommunication services [7][8].

By implementing these solutions, the telecommunication sector in Palestine can enhance its resilience and capacity to provide essential services, even in times of conflict. These strategies will not only improve connectivity but also support education and overall socio-economic development.

V. Conclusion

In this article, we highlighted the reality of communications in Palestine and the challenges facing this sector. We also proposed and discussed several ideas and solutions that could contribute to enhancing the capacity of communication networks in Palestine and enabling them to operate during times of disaster.

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