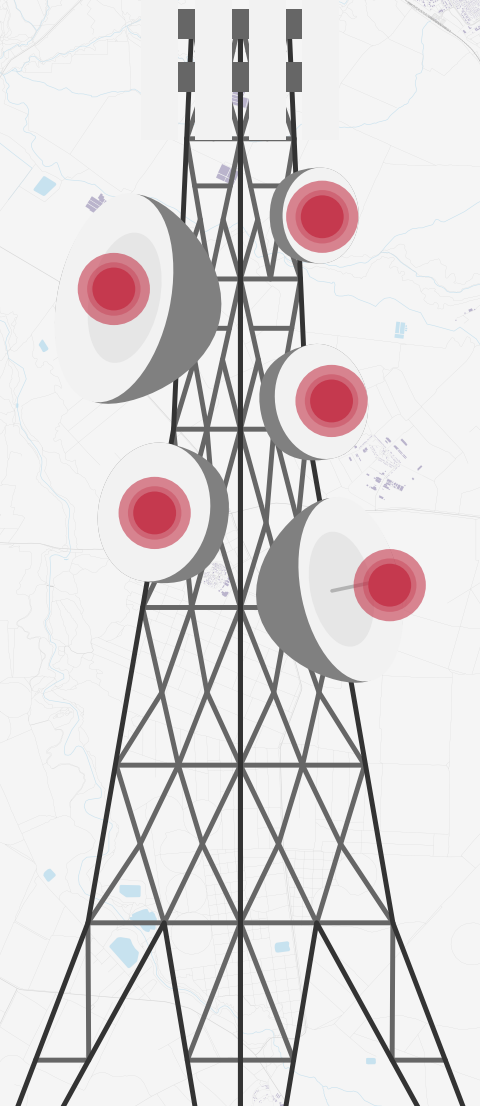# Gaza Telecommunications Infrastructure:

Assessment of Damages and Humanitarian Impact

7amleh- the Arab Center for the Advancement of Social Media

**Gaza Telecommunications Infrastructure:
Assessment of Damages and Humanitarian Impact**

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Executive Summary

Since the start of the war on Gaza, the telecommunications[1] infrastructure has suffered massive destruction, with an initial assessment indicating around 75% impacted and at least 50% fully destroyed[2]. The communication services faced different levels of interruptions since the start of the conflict, reaching full blackout at least 15 times[3]. While the destruction of infrastructure was the major contributor to communication services interruption since the start of hostilities, other factors have been contributing to it, including electricity cuts, destruction of underground infrastructure, and frequent displacement of people which increased human density in shelter places. The interruption in communication services has contributed to the suffering of people in Gaza who became unable to call emergency and rescue services, contributing to the death toll increase due to the impossibility or delay in reaching the call centers of those services. The operations of the humanitarian aid organizations were also interrupted, with a negative psychological impact on civilians as they became unable to reach their relatives during this humanitarian crisis. The interruption of internet services also blocked people from accessibility to the only remaining reliable electronic information sources, especially with the shutdown of local broadcasting stations and the killing of at least 134 journalists since the start of hostilities[4].

The reconstruction of the telecom infrastructure and services recovery should consider several factors while focusing on the immediate humanitarian needs. Priority should be given to recovering basic mobile and internet services in areas with dense populations such as shelter places and humanitarian operations centers. This paper analyzes the destruction of the telecom infrastructure and services interruption, elaborating on its impacts on humanitarian needs while laying out the foundation for different scenarios of recovery and reconstruction of the sector. The recommendation took into consideration the historical facts, destruction patterns and the need to increase the resilience of this sector.

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1. Telecommunications, also known as telecom, is the exchange of information over large distances. It's a broad term that includes various sectors, but all include a transmitter and a receiver. The medium of signal transference can be via various means—fiber, electromagnetic fields, light, cable, etc. There are two main types of telecom businesses; mobile telecom companies, and internet/landline telecom companies.

2. In accordance with PALTEL group and Ooredoo assessment and estimation, published by Ministry of Telecom and Digital Economy, available at: https://www.mtde.gov.ps/home/news/23014?culture=en-US

3. Telecommunications blackouts Amidst the Ongoing War on Gaza, Palestinian Digital Rights, Genocide, and Big Tech Accountability, available at: https://7amleh.org/storage/genocide/English%20new%20(1).pdf

4. International Foundation of Journalists report on targeting journalists, available at https://www.ifj.org/war-in-gaza

Introduction

The ongoing conflict in Gaza has had a devastating impact on the Palestinian people, it has resulted in massive loss of life, thousands wounded, destruction of Gaza's infrastructure and almost complete disruption of basic services and business activities. An already fragile telecommunication infrastructure in Gaza was not a difference and has gone through massive damage since the start of hostilities. This damage resulted in severe interruption of communication and internet services, compounded by long years of sectoral under-development, mainly due to restrictions imposed by the Israeli government leveraging the terms of the Oslo Accords which granted full control of international gateways and mobile spectrum[5]. On November 14 2023, Abdulmajeed Melhem, Chief Executive Officer of Paltel Group, stated: «It was quite clear that these disruptions resulted from deliberate actions perpetrated by Israeli authorities, and it happened twice afterwards. All international fiber cables that connect Gaza to the West Bank and the world go through Israeli Territories and, as a matter of fact, the Israeli Authorities can bring down connections whenever they want. They did just that despite all political, legal, and commercial agreements that are signed between all concerned parties.[6]»

The interruption in telecom services had severe impacts on the daily life of people who became unable to call emergency and rescue services, contributing to the death toll increase due to the impossibility or delay in reaching the call centers of those emergency services. The operations of the humanitarian aid organizations were also interrupted, the psychological impact on civilians is also a critical outcome that cannot be neglected as they became unable to reach their relatives during this humanitarian crisis. The interruption of internet services completely blocked people from accessibility to the only remaining reliable electronic information sources, especially with the shutdown of local broadcasting stations and the killing of at least 134 journalists since the start of hostilities.

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5. According to Annex 36 of the Israeli-Palestinian Oslo Interim Agreement from 1995, any use of radio spectrum in West-Bank and Gaza is subject to the approval of the Israeli government. The radio spectrum is defined as the invisible radio frequencies that wireless signals travel over. Those signals are what enable us to make calls and sends data from our mobile devices.

6. Letter sent on November 14, 2023 on behalf of Abdulmajeed Melhem, Chief Executive Officer, Paltel Group to Human Rights Watch and Access Now in response to November 9, 2023 letter Re: Internet and telecommunications shutdowns and disruptions in Gaza, available at: https://www.hrw.org/sites/default/files/media_2023/11/gl.2023.11.14.Response%20from%20Paltel%20to%20Human%20Rights%20Watch.pdf

The situation in Gaza highlights the broader issue of digital rights, including the right to access the internet, the right to information, and the protection of these rights under international law. The UN has increasingly recognized internet access as a fundamental human right, crucial for freedom of expression and access to information, especially during times of crisis. In 2016, an addition to Article 19 of the Universal Declaration of Human Rights reaffirmed this, declaring that the promotion, protection, and enjoyment of human rights on the Internet must be safeguarded[7].

Since the start of hostilities in Gaza, the interruption in telecommunication services was driven by different causes before being impacted by the destruction of infrastructure, followed by a destruction pattern aligned with the military operations on the ground. Most of the internet service providers (ISPs) and broadcasting stations shut down their networks during the initial days due to electricity cuts except for PALTEL and Ooredoo, who relied on their existing diesel generators and fuel storage to provide electricity to some of their network elements. This was a short-period interim solution to keep services until the fuel storage got fully depleted, causing another full blackout of the services[8]. The partial recovery of the services during the war period was supported by different interventions, initially through fuel supply by the UN to the two working mobile operators then by performing repair services of some of the towers and facilities that were partially destroyed, which was enabled by bringing in some spare parts starting from February 2024. The two mobile operators also supported people in Gaza by giving all their subscribers monthly free bundles of call minutes that are automatically renewed, which helped people stay connected to an extent during this crisis. During the initial period of hostilities, which saw frequent blackouts of communication and internet services, people relied on alternative methods of communication including the acquisition of e-SIM cards from abroad, and political pressure to use Low Earth Orbit (LEO) satellite communications such as Starlink for providing internet services.

The objective of this research is to study the telecommunications infrastructure damage in Gaza and its impact on the people's daily lives and digital rights in accessing information and connecting to each other during this crisis, it also explores and proposes recommendations for recovery and future reconstruction efforts. Overall, it focuses on the following areas: (i) pre-conflict status and its

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7. United Nations General Assembly, A/HRC/32/L.20 https://www.article19.org/data/files/Internet_Statement_Adopted.pdf

8. Wafa news agency press release on telecom services blackout due to depletion of all energy sources, available at: https://english.wafa.ps/Pages/Details/139337

impact on the current situation; (ii) damage caused to the telecom infrastructure during the period of the war (iii) impact of services interruption on the daily life of people and humanitarian needs, (iv) alternatives to local telecom services that were explored by people during blackout times; and (ix) actionable recommendations for reconstruction efforts based on the situation assessed.

Background

Telecommunications is revolutionizing the lives of people in many ways. It has made it easier to stay connected with friends and family, learn new things and even conduct business. Inclusive, accessible, and high-quality connectivity has become the foundation of a flourishing economy and an informed society. During emergency times, telecom services play a crucial role in connecting people with emergency services and save hundreds of lives while contributing to psychological relief of people by enabling them to connect with their relatives and loved ones. Needless to mention the core enabling role of telecom in the digital transformation of different services, especially public services.

The telecommunications sector in Gaza suffered from long years of under-development, mainly attributed to political constraints imposed by the Israeli government which took advantage of the terms of the Israeli-Palestinian Oslo Interim Agreement from 1995. According to article 36 of annex 3 of this agreement, any use of radio spectrum needed for mobile communications in the West Bank and Gaza is subject to pre-approval of the Israeli government. Gaza was suffering from major gaps in mobile broadband services due to the refusal of the Israeli government to allocate bandwidth for 4G or 3G services and restrictions on access to international capacity and vital equipment. The same agreement also provides for Palestinian operators to have direct international connectivity only once the network in Jerusalem is portioned[9], which still has not happened, and therefore sets the dependency for Palestinian operators to go through Israeli operators for international connectivity. This also applies to terrestrial connectivity cables to Egypt and Jordan, which can only be accessed by purchasing capacities through the Israeli operators. Moreover, the import of equipment for ICT companies also faces restrictions from the Israeli government, which have become stricter since 2006 after the takeover of the Strip by Hamas.

This long period of under-development and restrictions resulted in a fragile telecom sector in Gaza which hampered the benefits of advanced services for Gazans, especially in mobile high-speed internet and data-driven applications that could improve people's lives and enhance their digital rights. Gaza is the only reported place in the world with mobile coverage fully limited to outdated 2G technology due

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9. This means inclusion of the telecom sector in East Jerusalem under the Palestinians while handing over the infrastructure to them as in West-Bank and Gaza. Under Oslo agreement, Jerusalem was included under the final arrangements, a milestone that was not reached until now.

to non-technical restrictions, which limit mobile communication services to voice and SMS only. The impact on the service quality and cost of internet connectivity also became clear during the initial days of the war when a complete blackout of internet and mobile services happened before the start of Israel's military activities and destruction.

The stakeholders' structure of the telecom sector is simple. Not like the electricity and water sectors, the market is fully owned and operated by the private sector with no involvement of the government in service provisioning. PALTEL group dominates the internet segment while sharing the mobile segment with Ooredoo through its mobile arm Jawwal. PALTEL group was also dominating the wholesale internet market, selling infrastructure access to other Internet Service Providers (ISPs) operating in Gaza, such as Mada and Fusion. As for the regulatory and governance framework of the sector, some of the service providers such as PALTEL Group and Ooredoo, are licensed by the Ministry of Telecommunications and Digital Economy in Ramallah, while other small operators were licensed from the de-facto government in Gaza or were operating without license. Other stakeholders involved in the telecom market include the newly established Telecom Regulatory Authority (TRA).

Problem & Objectives

In accordance with an initial assessment of the telecom operators in Gaza, at least 75% of the mobile infrastructure has been impacted[10] The fiber optics backbone in Gaza has also been severely damaged, largely impacting the internet services. The data centers and switches were also severely impacted, while the underground infrastructure faced severe damage that cannot be estimated as it is positively correlated with the damages in the housing sectors which is increasing daily. It is therefore estimated that no more than 30% of the mobile towers and other infrastructure elements are still active today, concentrated in very specific areas that were not exposed to military attacks. The damage in Gaza took a specific pattern since the beginning of hostilities on 07 October 2023, which was aligned with the spread of the military operations over time and geography. The military operations started with intensive airstrikes between 07 – 27 October 2023 including a full blockade of the Gaza Strip. After this date, the ground military operations started in the northern areas, gradually advancing to the south and including invasion from the middle towards central regions. Comparing two damage assessment maps from OCHA-UNOSAT dated 07 November 2023 (map 1[11]) and 06 July 2024 (map 2[12]), respectively, the geographic spread direction of damage along time can be clearly observed. The first map shows damages concentrated in the Northern areas during the early period of hostilities, while the second one shows the spread of destruction to middle and southern areas seven months later. The destruction in many sectors, including telecommunication, followed this pattern, especially the underground infrastructure through which high-speed internet is provided in Gaza.

10. Ministry of Telecommunications and Digital Economy has published summary mobile and internet infrastructure assessment in Gaza as the current body overseeing the telecom sector, available at: https://www.mtde.gov.ps/home/news/23014?culture=en-US

11. UNOSAT damage map on 07 Nov 2023, available at https://unosat.org/static/unosat_filesystem/3734/UNOSAT_A3_GazaStrip_OPT_CDA_20231107_V3.pdf

12. UNOSAT damage map on 06 July 2024, available at: https://unosat.org/static/unosat_filesystem/3904/OCHA-OPT-015_UNOSAT_A3_Gaza_Strip_OPT_CDA_06072024.pdf

Picture 1: Map 1 to the left shows the level of damage on 23 Nov 2023, while Map 2 right shows the damage on 06 July 2024 (source: unosat.org)

The disruption in telecom services was caused by several factors in addition to the infrastructure damage. While it followed a pattern that is directly linked with the housing and road destruction spread, it was also linked with electricity blackouts during the initial period of the war. With the complete blackout of electricity and fuel entrance blockage shortly after 07 October 2023, many of the small internetservice providers turned off their equipment and went out of service[13]. However, this was not the case for PALTEL and Ooredoo, the two licensed mobile operators who relied

13. In accordance with feedback received from the Telecom Regulatory Authority (TRA).

on their existing diesel generators and own fuel storage to continue running their network elements that remained active. This helped sustain the services for some time, especially in the central and southern areas where the damage was still much less than in the northern areas. The first complete blackout took place on 29 October 2023 and was not due to an electricity cut but to the disconnection of the main fiber optic cables connecting the national backbone with data centers hosted inside Israel, which provides international connectivity. This fiber optic connection was restored in around 48 hours, leading to the resumption of the services that continued until 16 November 2023. At this time, with the depletion of service providers' fuel storage and continuity of blocking the entrance of fuel and other goods into Gaza, another complete blackout of the telecom services took place[14], which continued until the United Nations (UN)[15] allocated some fuel to the telecom operators from the quantity that was allowed to enter Gaza through Rafah crossing under UN supervision, only for urgent humanitarian needs and on limited pre-determined quantities. This helped PALTEL and Ooredoo resume their services by operating their diesel generators and electrifying some of their priority sites that remained active. After this, the telecom services passed through different periods of blackout and restoration over time, depending on the daily fuel supply from the UN. The fuel needs were replenished on a daily or short-term basis, creating uncertainty in operations and hence blackouts from time to time. For example, the services were resumed a few days after 16 November 2023 but went disconnected again for at least 4 days during December 2023[16]. It is believed that it was not until December 2023 that the infrastructure damage started to be the main contributor to the telecom services disruption in Gaza[17]. This damage was also linked with the spread of ground operations towards the center and south which impacted all categories of infrastructure, such as mobile towers, data centers, switches, fiber optics backbone and even underground infrastructure (copper and fiber optics). The telecom service providers were initially unable to assess which parts of the network were damaged or perform any physical damage assessment on the ground, due to the high safety risks associated with their

14. Wafa news agency press release on telecom services blackout due to depletion of all energy sources, available at: https://english.wafa.ps/Pages/Details/139337

15. Updated Report of OCHA on getting approval of Israeli Authorities on allowing UNRWA brining in a daily amount of 60,000 liters of fuel through Egypt for the telecommunications sector, available at: https://www.unocha.org/publications/report/occupied-palestinian-territory/hostilities-gaza-strip-and-israel-flash-update-42

16. Press release from Report News agency about the blackout taking place in December 2023, available at https://report.az/en/other-countries/telecom-services-restored-in-gaza-strip/

17. This is based on analysis of blackouts, their timing and causes.

staff movement on the ground. In accordance with the Interim Damage Assessment (IDA) study performed jointly by the World Bank, UN and EU, the estimated damage of the sector in March 2024 was estimated at 90 million USD, excluding damage to underground infrastructure[18]. The next section addressed the estimation of the monetary value of the destruction in the telecom infrastructure.

Another important factor that contributed to communication service interruption is the frequent evacuation of people from different places. Since the beginning of hostilities, Israeli forces have issued various instructions to civilians to evacuate certain areas ahead of planned military operations and active combat. The map next illustrates population movements during the months of July and August 2024, the largest of which was issued on 01 July 2024 and affected 250,000 citizens alone[19]. In
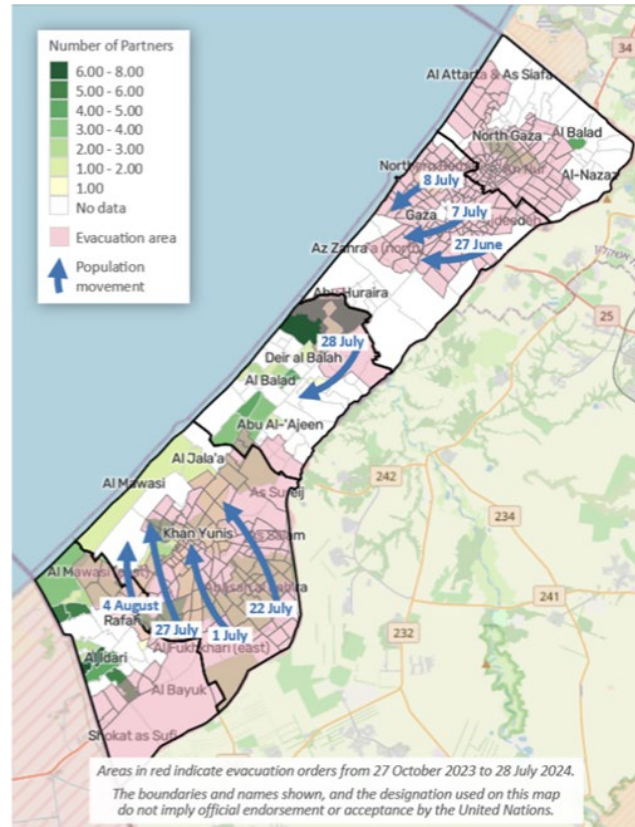
Picture2: Map showing population movements due to displacement instructions issued in July and August 2024 (source: UNICEF)

addition to the severe humanitarian impacts of such enforced displacement on the population, displaced people were moving to the nearest shelters that were already overcrowded for having received displaced people due to previous displacements from other areas. This increasing congestion of population in small areas increased connectivity challenges from two perspectives; (i) displaced people leaving non-destructed homes which could already have internet connectivity and mobile coverage; and (ii) new displaced people causing more congestion on available

18. Interim Damage Assessment report published by World Bank, UN, and EU. Available at: https://thedocs. worldbank.org/en/doc/14e309cd34e04e40b90eb19afa7b5d15-0280012024/original/Gaza-Interim-Damage-Assessment-032924-Final.pdf

19. UNICEF report on "New Evacuation Orders Lead to Further Humanitarian Consequences on Children and Their Families" available at: https://www.unicef.org/sop/media/4136/file/Gaza%20Strip-%20New%20 Evacuation%20Orders%20Lead%20to%20Further.pdf

mobile networks covering the shelters, which causes more deterioration in mobile services through increase in call drops and hence affecting other citizens who were already staying in those shelters from previous evacuations.

During this difficult period of instability and interruption in services, people in Gaza tried to rely on alternative methods of communication. One of those methods was subscribing to e-SIMs[20] from operators outside the country and making international roaming on the mobile networks that have coverage in areas close to the borders with Gaza. In getting bar codes for activating those e-SIMS, people relied on friends, relatives and groups' donations from outside Gaza who wanted to support their relatives and Palestinian people during this crisis[21]. Once activated, international roaming was activated on one of the Egyptian or Israeli mobile operators who had some signal coverage in areas close to the borders with Gaza. While this method worked for some people in specific areas close to borders, it suffered the following main drawbacks: (i) limited coverage to areas close to the borders such as Rafah or Beit Lahia; and (ii) high costs of calls as these e-SIMSs rely on international roaming with either an Egyptian or Israeli operator to make calls.

Another alternative was reliance on Low Orbit Satellite (LEO), such as StarLink, to provide internet connectivity in Gaza. This technology can technically provide high-speed internet as an alternative to the local services despite the higher costs. Initially, and after several posts and pressure on X platform (formerly Twitter), Starlink owner Elon Musk spoke about his willingness to provide the service to Gaza, similar to Ukraine, but later the Israeli government announced an agreement with Starlink to launch the service in Israel and Gaza and the requirement of approval of the Israeli government of any service provision in Gaza. Starlink committed to this agreement with the Israeli government, but until now only one approval was given to one hospital in Gaza (the Emarati hospital) to use Starlink service[22].

The electricity blackout since the beginning of hostilities was not only a major

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20. e-SIM refers to electronic Subscriber Identity Module (SIM), which is the subscription module that allows activation to a mobile service from a network operator without having to use a physical SIM. The user can only receive a bar code from the e-SIM purchaser from any place in the world and scan it on his mobile device to activate the service. International roaming should be pre-activated on the subscription in order for the user to make international roaming with the specific operator in his country.

21. Guardian Report on using e-SIM cards in Gaza to over communication blackout, mentioning Egyptian activist Mirna Al Helbawi. Available at https://www.theguardian.com/world/2023/dec/17/esim-cards-internet-gaza-palestinians

22. Reuters press release on using Starlink service in Israel and Gaza and approving it for the Emarati hospital. Available at https://www.reuters.com/world/middle-east/musk-activates-internet-service-gaza-hospital-with-help-uae-israel-2024-07-24/

contributor to the interruption of telecom services but also increased the suffering of citizens in Gaza who had no reliable electricity sources to charge their mobile phones to stay connected. Citizens had to spend long hours walking long distances and waiting in queues to charge their mobile phones relying mostly on batteries charged by solar power or diesel generators[23].

23. Reuters report on "how to charge a phone in Gaza: patience required, sunshine helps. Available at https://www.reuters.com/world/middle-east/how-charge-phone-gaza-patience-required-sunshine-helps-2024-01-16/

Analysis - Infrastructure Damage

Like other sectors impacted by hostilities in Gaza, no physical damage assessment has yet been made on the telecom sector, which can only start after a permanent end of hostilities. All damage and loss figures published were based on estimation and interpolation taking into consideration certain assumptions.

This section builds an estimated figure of the destruction of telecom infrastructure in Gaza. The calculation methodology is based on multiplying the following two parameters: (i) The estimated level of damages to the telecom infrastructure assets; and (ii) The book value of those assets assuming they represent the replacement cost of new assets during reconstruction. This book value of assets is taken from the audited financial reports published by PALTEL group[24] and Ooredoo[25] as part of their listing requirements in the Palestinian stock market. The calculation methodology and analysis are also based on the following assumptions:

1. Gaza contributes 33% of the telecom assets for the two companies, as no split of assets is made in the reported financial statements which is reported on a lump sum basis for both the West Bank and Gaza.

2. Fully destroyed assets can only be fully replaced and hence reconstruction costs represent 100% of the original book value of the asset before depreciation.

3. Partially destroyed assets could be repaired using spare parts and human efforts. Their repair cost is assumed to equal 35% of their full replacement.

4. Estimation was built only on telecom infrastructure assets, it does not include buildings, warehouses, spare parts, offices, showrooms, motor vehicles, heavy-duty machines, furniture, or equipment.

5. The book value of assets was taken from Note 6 of the financial statements of PALTEL group and note 3 from Ooredoo financial statements. The balance of assets at the end of the year was considered in the calculations for the two companies, this value represents the historical acquisition costs of those assets before considering any accumulated depreciation. Table-1 below displays the total amount of those assets extracted for both PALTEL group and Ooredoo:

24. Audited financial reports of PALTEL group for year 2022, available at https://www.paltelgroup.ps/uploads/Paltel_December_2022_WD_-_English.pdf

25. Audited financial reports of Ooredoo Palestine for year 2023, available at: https://www.ooredoo.ps/cached_uploads/download/2024/05/02/ooredoo-annual-report-english-version-2023-1714651212.pdf

Table 1:

Calculation of Gaza allocation from Infrastructure Assets of telecom operators

Company	Wireless Networks (USD)	Wireline Networks (USD)	Gaza Share Wireless (USD)	Gaza Share Wireine (USD)
PALTEL Group	273,569,209	350,024,011	90,277,839	115,507,924
Ooredoo	131,820,615	--	43,500,803	--
Total			133,778,642	115,507,924

According to the estimated damage figures covered in the Background section, 50% of mobile and fixed infrastructure is expected to be completely destroyed, while 25% was partially destroyed. The partially-destroyed assets can be repaired when the situation on the ground allows. Based on those estimated figures, the assets value in the previous table and the assumptions listed above, the estimated value of telecom infrastructure reconstruction is estimated at 146 million USD (68 Million USD for fixed and 78 Million USD for mobile).

Conclusions & Recommendations

The ongoing conflict has had a devastating humanitarian impact on the Palestinian people living in Gaza. It has resulted in massive loss of life, the destruction of Gaza's infrastructure, and almost complete disruption of basic services and business activities. Resolving the conflict and dealing with the aftermath will therefore require historic efforts from both Palestinian institutions, development partners and neighboring countries. Given this massive destruction in all sectors and the interlinkages among different sectors, the recovery and reconstruction of the different sectors in Gaza requires a visionary and holistic approach, considering careful multi-phase implementation and close inter-sectoral coordination.

Considering the cross-sectoral nature of the telecom services, its recovery and reconstruction in Gaza depends extensively on a permanent and complete stop of ongoing hostilities and whether it is based on political settlement. With such high risks and uncertainties, it makes sense to put different scenarios for the sector reconstruction and services recovery:(i) scenario 1, which is based on a cease-fire without political settlement, and (ii) scenario 2, which is based on long term political settlement that will change the current situation of Gaza strip and building things better.

Scenario 1 therefore considers the immediate needs of people in Gaza and should cover interventions to support their recovery from this devastating war. Scenario 2 takes a long-term and peaceful approach to achieve a prosperous economy centered around job creation, and human and social development. With full ownership of the telecom sector by the private sector, the reconstruction and recovery of the sector cannot be done without the full support and direct involvement of the international community.

Scenario 1: represents short to medium-term interventions with the objective of returning to the pre-war status quo in the best case. It includes the following proposed actions:

1. Restore the basic mobile services to serve the humanitarian needs to the maximum possible extent. This is achieved by increasing the amount of fuel allocated to telecom service providers by the UN and other humanitarian organizations, in addition to reallocating mobile network resources closer to shelter places and humanitarian service centres.

2. Provide high-speed internet through temporary solutions, covering the shelter centres and humanitarian support centres, such as hospitals, schools, and humanitarian aid organizations. This will be on a short to medium-term temporary basis until the full reconstruction of the underground infrastructure starts.

3. Utilizing internet connectivity to serve short-term humanitarian needs in education and health until the long-term recovery starts (e-learning and e-health platforms).

4. Building platforms by humanitarian aid organizations to facilitate the distribution of food and financial aid in a fast and efficient way that also ensures maximum inclusion. This includes platforms that send e-vouchers or codes to the mobile phones of citizens they can use to redeem food from reliable retail shops or distribution centres. The success of such platforms extensively depends on the recovery of mobile and internet services in Gaza.

Scenario 2: This scenario extends scenario 1 to the medium and long-term proposed interventions and marks a peaceful and prosperous scenario that will leverage modern telecom services in improving the lives of people and their prosperity. This scenario includes the following proposed interventions:

1. Rebuilding mobile infrastructure with 4G and 5G technology, with massive investment from the private sector and direct support from the international community

2. Increase the resilience of the ICT sector to shocks such as electricity cuts, through the deployment of renewable energy solutions combined with electricity storage.

3. Deployment of Fiber to the Home (FTTH) in areas where the underground infrastructure has been fully destroyed. This will be a long-term evolutionary intervention that depends on the reconstruction of housing, roads, and other infrastructure   sectors.

Recommendations:

1) To Policy Makers:

- Ensure protection of digital rights, including the right to access the internet.

- Implement legal frameworks that prevent deliberate internet blackouts during the war, in line with international obligations.

- Advocate for political solutions that guarantee uninterrupted telecom services and rebuilding Gaza's telecom infrastructure.

2) To International Community and Development Partners:

- Provide support for the restoration of telecom infrastructure.

- Facilitate long-term plans and investments to establish resilient and sustainable telecommunications systems.

- Promote Gaza's inclusion in global digital initiatives and ensure no restrictions impede access.

To the Private Sector, including Telecom Companies:

- Collaborate with humanitarian organizations to ensure the continued delivery of essential communication services.

- Support reconstruction in Gaza with a focus on modern technologies (as stated in the scenarios above).

- Invest in sustainable and renewable energy solutions to address power outage