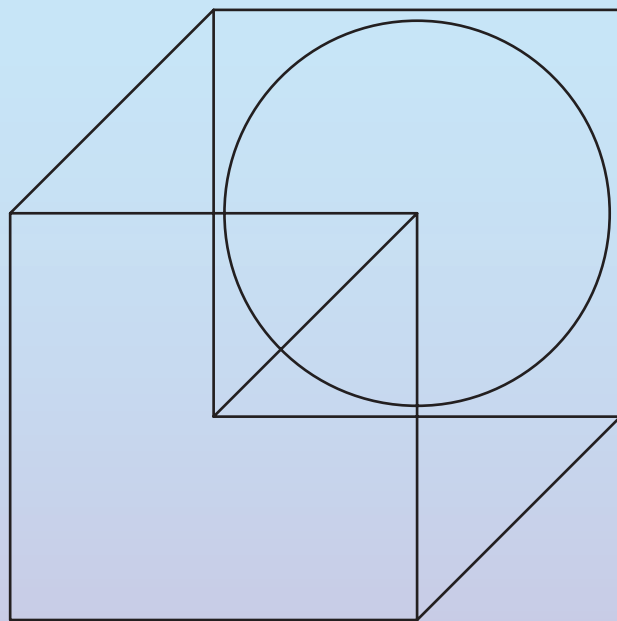




Collaboration for Connectivity

Digital Access, Inclusion and Participation



UNHCR
Innovation
Service

Collaboration for Connectivity

Understanding how to implement humanitarian connectivity partnerships with
private sector partners



UNHCR Innovation Service
Digital Access, Inclusion and Participation

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About this report and acknowledgements

This report has been commissioned by UNHCR Innovation Service as part of the Digital Access, Inclusion and Participation programme. Evolving from the Service's work on Connectivity for Refugees, this report aims to further examine frameworks for extending access to connectivity out to refugees and their hosting communities. It is authored by Troy Etulain and has been edited by John Warnes.

In order to support community self-reliance, UNHCR often seeks to leverage market-based approaches to telecommunications services, and principally the inclusion of refugees in national frameworks and regulation to facilitate this. The impetus for this report is to understand potential models and approaches for collaborating with commercial connectivity providers to extend services, and develop a more detailed understanding on the dynamics of such partnerships to encourage their successful undertaking.

The author of this report draws on literature, case studies and his own experience in delivering humanitarian connectivity projects in partnership with commercial connectivity service providers, specifically in sub-Saharan Africa. While highlighting key considerations to be taken into account, it is not prescriptive 'blueprint' in which to engage in partnerships, which are by nature contextual. It is a collection of insight and advice that can enable anyone considering forming a humanitarian connectivity project to have a well-informed conversation with potential partners. UNHCR Innovation Service provides further guidance on projects relating to humanitarian connectivity projects to enhance digital access for refugee communities on its web portal.

The author would like to express his appreciation to many valued colleagues for their collaboration, creative support and managerial leadership in the writing of this document, and in the formation of the partnerships described in the case studies:

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Introduction

In 2016, UNHCR articulated a clear goal to provide connectivity for refugees, a vision built on evidence captured in the “Connecting Refugees” report.¹ This vision has evolved to now focus on refugees’ right to be digitally included, emphasising their inclusion in national frameworks for telecommunications access that are - for the most part - liberalised and regulated environments that endeavour to achieve universal access through primarily commercial delivery.

Given this operating environment, UNHCR recognises that collaborating with private sector partners and developing market-based approaches for provision of connectivity services is one of the most effective ways to ensure sustainable internet access for displaced individuals. However, constructing successful collaborations with mobile network operators (MNOs) and internet service providers (ISPs) requires a strong understanding of how they work and what motivates them, a nuanced consideration of what connectivity means to individuals and a creative approach to partnership models.

This document aims to provide this understanding by delving into these questions and features two case studies of successful partnerships, with the aim of informing and enabling more successful humanitarian connectivity partnerships that, as the Global Compact for Refugees explains, “reduc[e] associated risks and enabling low-cost mobile and internet access to these services where possible.”² With this in mind, this document:

- provides in-depth guidance for establishing humanitarian connectivity partnerships, including tools for evaluating possible partners, as well as detailed explanations of several potential business models.
- explores the concept of meaningful connectivity, which is intended to help project designers understand how mobile and internet use is experienced by the displaced people they are supporting, and how this evolves over time.
- briefly covers the role of national telecommunication regulators is also highlighted, both because they exert control over connectivity providers’ activities and because of the value of involving them in constructive conversations on refugee needs.
- Explore other emerging themes such as the distinct challenge of personal data and security, the changing global environment around information and inter-personal connections and a useful approach to comparing and evaluating humanitarian connectivity projects in diverse scenarios.
- tells the stories of two situations that have demonstrated that humanitarian and commercial partners can form partnerships that support realization of their respective goals.

Evaluating humanitarian connectivity needs through a commercial lens allows one to focus on the factors contributing to the sustained provision of mobile or internet access. This contrasts with humanitarian connectivity operations where technical teams with short-term emergency response funding rush to get free connectivity equipment (often Wi-Fi) up and running, focusing solely on an immediate solution, using whichever equipment will do the job quickest. This approach, where

connectivity is provided charitably, is less likely to be sustained, because the costs associated with providing it are constant and ongoing, while humanitarian funding is allocated and spent in cycles. For example, one NetHope appeal for financial support for refugee connectivity in Greece showed the tenuousness of the humanitarian, non-commercial approach. In the solicitation, which described connectivity as “essential to those confined and waiting,” NetHope requested tiered donations that would sponsor camp connectivity for as little as one day and up to one year. “Every gift”, the US-based NGO stated, “ensures that camp connectivity continues with no disruptions.”³ Since this request for public support, the networks have eventually transitioned to an arrangement whereby maintenance is now provided by IOM and Greek authorities.⁴

For humanitarian actors to engage in successful connectivity partnerships, they must adopt a mindset that is supportive of the notion that local private sector actors have a positive role to play in the provision of humanitarian assistance on a commercial basis, not purely as a matter of corporate social responsibility. This mindset accepts the fact that companies will earn revenue from providing goods or services to individuals or organizations that are providing or are in need of humanitarian assistance, or have other factors driving their actions such as brand reputation, customer retention etc. Indeed, without this revenue, sustained connectivity services would simply not be available. While companies or their employees may individually care about the plight of the displaced, their core function and means of survival are not the provision of humanitarian assistance. Thus appealing to companies’ sense of charity will not lead to a long-term solution. Humanitarian actors must therefore think in commercial terms and try to see the world through the eyes of potential private sector partners to figure out how to convince them to spend time, resources and take some measure of risk on a partnership. When a commercial connectivity provider has a constant profit motive to keep a service up and running, it will.

In all this the humanitarian’s task is to ensure for the protection of the vulnerable according to their specific needs based on age, gender or demographic, and ensure that partnerships are designed in ways that accommodate associated goals regarding digital inclusion including inter alia levels of basic education, financial means and digital literacy. In today’s world, this task requires a level understanding of the risks and benefits individuals experience from using communications technology and commercial communications services that for the most part hasn’t traditionally been required of humanitarian actors.

¹ <https://www.unhcr.org/publications/operations/5770d43c4/connecting-refugees.html>

² Global Compact for Refugees, Chapter 2, Section 2.2 https://www.unhcr.org/gcr/GCR_English.pdf

³ Nethope Newsletter - Dated 27/12/2017

⁴ <https://nethope.org/2019/12/06/iom-and-greek-government-to-assume-maintenance-of-nethope-networks-for-refugees/>

Part 1: Understanding

Operational Context

The term “connectivity” is often used simultaneously to define what are generally two distinct user experiences (phone vs. computer), which have their own business models, hardware, actors and implications for humanitarian assistance. The term refers both to mobile and internet connectivity, even though there is a clear difference in utility between, for example, a simple voice call and an HD video streamed via 5G. It does not refer to a specific minimum speed, rather to having some form of connectivity vs. having nothing. It also refers to the effort of devising creative solutions that provide sustained solutions where, left to their own devices, markets would leave out the people humanitarian actors seek to connect. While the connection speed required to run popular applications will change over time, an individual making the fundamental move from nothing to something will always find it transformational.⁵

While some experts have said, “Any technological intervention in humanitarian or human rights contexts without an evidence base is cause for concern.”,⁶ this document emphasizes the agnostic provision of commercial connectivity offered to displaced populations in the same way to all other people in a country. In areas where forcibly displaced persons are hosted, markets are often already established for commercial connectivity services. As such this is not a question of re-establishing connectivity within humanitarian context, rather about establishing partnerships that incentivise and enhance the viability of commercially sustainable connectivity to forcibly displaced populations, which includes refugees and internally-displaced persons (IDPs).⁷ The focus here is on connecting unconnected areas with lasting commercial solutions - particularly poignant given the average duration of refugees in camps and settlements is approx. 17 years globally⁸ - and addressing the particular challenges faced by refugees. For example, refugees or IDPs might not be able to provide the identification required for SIM card purchase, because they lost it while fleeing. In addition to potential language barriers, they also might have their movements restricted to designated areas, limiting their access to commercial services. These challenges sometimes mean that a focus on commercially sustainable connectivity nevertheless includes the potentiality that humanitarian organizations are in a position to subsidize access for some displaced populations.

Commercial connectivity can start small and successfully grow. There is a widely held opinion in connectivity projects that, even if only a 2G connection is introduced into a location that previously had nothing, demand for increased connectivity services will ensue, as well as people’s readiness to spend more on these services. Even if it is basic, if connectivity can be established, individuals, organizations and systems will orient themselves around it. This is similar to the argument made by

⁵ The diverse and dynamic trends Cisco noted in its “Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017–2022 White Paper” suggest that it is most useful to evaluate the cost and usefulness of a particular technology when designing a project, rather than to rely on any pre-established benchmarks.

⁶ “Refugee Connectivity: A Survey of Mobile Phones, Mental Health, And Privacy at A Syrian Refugee Camp In Greece”. Harvard Humanitarian Initiative and Data and Society, 2019. https://datasociety.net/wp-content/uploads/2018/04/Refugee_Connectivity_Web.MB4_8-2.pdf

⁷ In addition to refugees and IDPs, UNHCR’s mandate includes asylum seekers and stateless people. (See: “Asylum and Migration” on the official UNHCR website: <https://www.unhcr.org/en-us/asylum-and-migration.html>.) Though all four categories are not mentioned consistently through this document, the recommendations presented are intended to benefit people in any of them.

⁸ <https://blogs.worldbank.org/dev4peace/2019-update-how-long-do-refugees-stay-exile-find-out-beware-averages>

organizations and experts that advocate for the provision of free 2G data: If people get a taste for even slow data, they will realize some benefits and strive for more.

Along similar lines, humanitarian connectivity project designers should challenge the stereotype that unconnected or economically-disadvantaged populations have limited knowledge of how mobile phones work or what the Internet is, and that their preference is unquestionably for offline communication channels, as though they were as unexposed to technology as the residents of the remote North Sentinel Island. In The Digital Lives of Refugees, for example, the GSMA found that “most refugees are aware of mobile internet,” though the proportion of those who have experience using it varies by country of origin.⁹ Similarly recent information and communication needs assessments undertaken in refugee settings¹⁰ demonstrate that ‘connected’ channels are frequently preferred by many demographics within forcibly displaced communities. The reality is that rural dwellers sometimes visit urban areas and observe communications technologies in use, and mobile phone users pass through rural areas using their phones. Either way, it is necessary to examine each situation and each group of forcibly displaced people with fresh eyes, and understand their specific preferences as to how they engage with ‘connected’ communication channels, as a precursor to developing partnerships to extend access.

In simplified terms, the approach to designing a humanitarian connectivity project alongside a private sector provider can be summed up in the following 3-step process:

1. Evaluate the refugees’ existing abilities and needs, and focus on what is meaningful to them
2. Evaluate potential commercial partners and business models
3. Design a project that meets the needs of refugees in a manner that fits with commercial partners operating models.

Meaningful Connectivity

In order for humanitarians to achieve the best results from a connectivity partnership with a commercial provider, they must carefully consider how the connectivity could and likely will be valued, understood and used by refugees. These considerations, which are simultaneously philosophical and practical, will influence which technologies and business models humanitarian workers prioritize in partnerships, as well as any of the subsequent costs and subsequent connectivity-related programming.

Definition and Concept of Meaningful Connectivity

The term “meaningful connectivity” is gaining traction amongst global development and humanitarian actors as the term for these considerations. The term describes the quality of connectivity that enables an individual to access to content and communications tools that makes a difference in their lives. The character and extent of this difference is individual-specific and changes over time. The 2019 ITU Broadband Commission report “*State of Broadband: Broadband*

⁹ “The Digital Lives of Refugees: How displaced populations use mobile phones and what gets in the way”, 2019, p. 22. <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/07/The-Digital-Lives-of-Refugees.pdf>
¹⁰ <https://medium.com/unhcr-innovation-service/unhcr-turkey-goes-in-search-of-improved-communication-with-refugees-60bc0d6937fd>

as a Foundation for Sustainable Development” explains that “‘meaningful universal connectivity’ strategies also recognize that non-technology and non-economic issues play a central role in decisions to participate online or not, such as lack of digital skills, linguistic and literacy barriers, social norms, and cultural attitudes.”¹¹ While the African Union’s digital plan specifically states that by 2030 all people on the continent should be able to access a 6 MB/sec connection for \$.01 per MB¹², the 2019 Global Broadband Plan for Refugee Inclusion takes the position that the faster the connection the better. “While the UNHCR is not specific about a technical definition of connectivity” the plan said, “we can agree that the value of any connection rises with increases in bandwidth. Therefore, we should aspire to connect refugees to the highest speeds practical.”¹³

Rather than measuring meaningfulness by a numerical standard however, it is ultimately necessary to contextualise understanding of what ‘connectivity’ means, and understand the wants and needs of every individual in any given context. Everyone’s priorities will vary, and everyone should be in a position to choose for themselves what those priorities are. That said, most people utilize connectivity to access information/content, communication tools or increasingly financial services. The Digital Lives of Refugees, for example, found the most popular use of phones by refugees in the three camps it surveyed was calling and texting, followed by financial services and then information/content.¹⁴ Previous experience, including that highlighted in this document’s two case studies, suggests value in designing programmes in conjunction with and aligned to these three main connectivity use cases.

While we shouldn’t presume to know what is meaningful for others, it is however fair to question whether individuals within a community are aware of all available resources (and if they were would their behavior change) and whether they lack any skills (e.g. reading or writing) or knowledge (e.g. how to use/access tools) to use connectivity in a way that would be most meaningful for them. Given the pace that new services become available, there is always a degree of deficit between what could be considered meaningful at any given point, and what could potentially be meaningful, were communities to have perfect information and capacity to utilise available services. It is understandable that a connectivity program designer would need to make generalizations based upon experience and contextual information when assessing a particular refugee population’s digital literacy. A common challenge is that, while digital literacy cannot be obtained overnight, programme decisions usually need to be made in the short-term.

Indeed, meaningfulness evolves as a person’s digital skills and world awareness grows. There is sometimes a pattern in the stages of refugee’s period of displacement, where they gain regular internet access for the first time in their lives once they arrive. While meaningful connectivity will be individual-specific, for humanitarian purposes, it is reasonable to assume that refugee groups coming from the same origin will have similar levels of digital literacy and that demographic characteristics of their home country will initially carry over into the refugee setting. There is no need to perpetuate their previous status quo, however, especially if women or other groups were

11 <https://broadbandcommission.org/Documents/StateofBroadband19.pdf>

12 The Draft Digital Transformation Strategy for Africa (2020-2030), African Union <https://www.tralac.org/documents/resources/african-union/3013-the-draft-digital-transformation-strategy-for-africa-2020-2030/file.html>

13 Global Broadband Plan for Refugee Inclusion, p. 51. <https://www.broadband4refugees.org/plan>

14 Ibid. p. 21.

proportionally less likely to own or have access to a mobile phone. A forcibly displaced population’s new setting provides opportunities to promote new norms around access to connectivity.

Extended periods of humanitarian intervention to enhance digital access will present opportunities for commercial operators to increase their customer base. Where humanitarian activities have been undertaken to engage communities with digital tools and technology, it is presumed that the “older” a refugee population i.e. the longer the duration of time spent surrounded by humanitarian intervention, the likelier it is to have increased its digital literacy due to targeted programming. Enhanced digital literacy of a population presents a market opportunity for MNOs and means that livelihoods, education, etc. programs can be more sophisticated at utilizing mobile or internet connectivity as a primary means of delivery. Further, this suggests humanitarians should think about the learning journey refugees undertake using such communications tools or consuming or interacting with the content they access via these tools. Finally, it is worth considering how refugees with comparatively advanced knowledge or skills might play the role of training other refugees in effective and efficient internet use. As UNHCR has noted, some active and intellectually curious refugees are “leading their communities in a society evolving to a dramatic technological shift that will bring them into the digital era”¹⁵.

Programme Design

To design programs that enable meaningful connectivity for refugees, it is necessary to practice professional and systematic empathy. Here, approaches should follow the letter and spirit of UNHCR’s commitment to Accountability to Affected People, including the guidance to “learn from continuous engagement with communities of concern and adapt interventions and programmes in response to new knowledge gained through community participation and feedback, both in the short and long-term.” Within available resources, humanitarian connectivity programme designers should analyze three main factors, including:

- 1. Refugee knowledge of and expertise with connectivity up until their arrival**
- 2. The host country context**
- 3. Refugee wants and needs for communications, content and financial services**

To address these items, humanitarian organisations - specifically media development agencies - have developed various tools, namely Information and Communication needs assessments¹⁶ (or Information Ecosystem assessments¹⁷) and Media Landscape Guides¹⁸. These tools provide approaches for building out an understanding of the above three points and are becoming increasingly utilized by humanitarian organisations, for instance in an inter-agency Information and Communication Needs Assessment that took place as part of the response to the Venezuela situation.¹⁹

15 “The epochal mission of local innovators”, John Warnes, UNHCR, July 15, 2019. <https://medium.com/unhcr-innovation-service/the-epochal-mission-of-local-innovators-f9c46843bf4f>

16 <http://www.cdacnetwork.org/tools-and-resources/i/20140721173332-ihw5g>

17 <https://internews.org/updates/mapping-your-communitys-information-ecosystem>

18 <http://www.cdacnetwork.org/tools-and-resources/media-landscape-guides/>

19 <https://reliefweb.int/sites/reliefweb.int/files/resources/73683.pdf>

Additional guidance on assessing refugee connectivity needs and opportunities can be found in UNHCR's [Information and Communication Needs Assessment Tool](#) and its guide [Understanding Information Ecosystems: Making it Happen](#). As of the writing of this document, the GSMA is also developing a new digital needs assessment tool, opening up the methodology of its 'Digital Lives of Refugees' report.²⁰

Complementary to the resources mentioned, below are several useful questions to ask as a part of an assessment specifically prior to designing a connectivity program for refugees. This is not a comprehensive set of questions, but should provide a strong conceptual foundation. They are grouped sequentially and thematically:

1. Up until arrival

Generally, specific information on the context and potential partner may be difficult to obtain prior to arrival in a country. Whether conducting a rapid assessment or a rigorous analysis, the important information to obtain should include a diverse group of people within a displaced population covering different ages, genders and demographic groups and should provide a good sense of digital literacy levels, device ownership and previous connectivity experience across the population as a whole. Example questions include:

- What is their existing level of digital literacy? What level of experience do they have with mobile phones and computers?
- Did they arrive with devices? If so, what type of devices are they, and are they able to roam in the host country? Are they able to top up?²¹
- Do they have experience making financial decisions about using connectivity, i.e. prioritizing connectivity over other potential life expenses?
- What was the amount and character of online content produced in the country they came from?

2. Host Country Context

It is very likely that other organizations have previously produced reports with useful information on the host country context. Reports issued within the previous two years are usually sufficiently up-to-date to provide a foundational understanding of the local context. Yet for censorship, blocking monitoring and any potential shutdowns, it will be necessary to assess the current situation. Example questions include but are not limited to:

- What is the quantity and quality of independent media content available in the host country? Are any websites censored? Is there information available in the mother tongue of refugee communities? Is there information that is relevant to a person's life circumstances?
- Does accessing the internet imply other costs or logistical challenges? How far does a person have to travel to gain access? Are there costs associated with travel? Are there unavoidable tradeoffs of any kind that must be made in order to access connectivity?

²⁰ <https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/07/The-Digital-Lives-of-Refugees.pdf>

²¹ The Displaced and Disconnected report by UNHCR highlights SIM registration as a potential key barrier to access. <https://www.unhcr.org/innovation/displaced-and-disconnected/>

- Does the immediate environment give refugees the chance to learn and understand more about what their connectivity options are? Is the web open in the host country? How independent is the telecommunications regulator? Does the country practice net neutrality?
One should not rule out the potential that online content or activity is, respectively, censored or monitored by the host country government.
- Do local MNOs and ISPs offer information material on services and rates in languages refugees can understand?

3. Refugee Connectivity Wants and Needs

One potential issue with establishing commercially sustainable connectivity for refugees is that it might create an incentive for them to stay rather than return home, and similarly restrictions on access to connectivity (or other services) have the inverse effect.²² It is indeed possible that, if connectivity provided to refugees is different to what they had in their country of origin, this could potentially impact important life decisions, anything from seeking asylum through to onward movement or repatriation. These dynamics may also impact host country governments' policies, who on the one hand may be wary of perceived permanence of refugee camps or settlements, but on the other look for long-term investment in connectivity in refugee hosting areas that expands access to hosting communities.

- Can refugees afford to access connectivity as much as they want?
There is a direct relationship between meaningfulness and affordability. Obviously, if a refugee cannot afford access, they cannot achieve meaningful access. It may be impractical to provide unlimited access to all refugees; however, it is possible to accommodate varying levels of disposable income.
- What are the physical ways refugees can access connectivity?
Device functionalities and overall quality matter for usefulness of and ease of access to information.
- Do refugees have regular access logistically speaking? Can they access whenever they want? In societies, cultures or locations where there is an expectation that unmarried women should not interact with non-relative men, have women been provided with the same access as men?
- Do the accessible and affordable content and communications choices make a difference in their lives? Do refugees engage in activities that are enabled by connectivity, or that they learned about because of connectivity?
- How much content can they access that is in a language they can read? If they are illiterate, how much audiovisual content can they access in a language they speak or understand?
One study found that more than half of online content is in English, even though it is the third most common mother tongue.²³
- Do refugees have functional privacy, both physically and virtually, when they use connectivity? Are there means and facilities for refugees to communicate without being overheard?
- Are refugees free from fear use of connectivity, from both online and offline threats?
- What are the main incentives for use of communications platforms?

²² "Bangladesh: Internet Blackout on Rohingya Refugees", Human Rights Watch, September 13, 2019. <https://www.hrw.org/news/2019/09/13/bangladesh-internet-blackout-rohingya-refugees>

²³ "Bridging the Linguistic Divide: The Impact of Language Rights on Internet Freedom", Andrea Brás, Localization Lab. March 8, 2019.

- Does connectivity offer access to a person’s past, present and future?²⁴
- Can information found be easily re-accessed? Does it give the person the opportunity to obtain as much information as they want (particularly in relation to new information)?

It can often be the case that refugees come across information for the first time, and once they log off, leave an internet facility, etc. cannot then later find the same information. Perhaps they did not write it down or save it in a virtual location.

- Does the content that is accessible change one’s understanding of oneself? Does it support realization of their dreams or aspirations?
- How does the connection speed compare with the rest of the world at that time? Do refugees, particularly those in protracted situations, have a sense that the connectivity they have access to is lower quality than others in the ecosystem, such that it sends an implicit message of inferiority?

The digital divide continues to widen with each passing day, whether premised on economics or other factors including gender or disability. Even if in the future all refugees have connectivity, and the speed is fast enough to stream HD educational videos, if the rest of the world, or even individuals in the immediate community, are streaming - to take an extreme example - holograms with live AI interfaces, the reality will be that people with slower connections might feel inferior and functionally be so in that they may lack access to the newest tools and content. Efforts should be made to determine what precisely equitable access means in a particular context.

The Telecommunications Regulator

Prior to evaluating commercial providers as potential humanitarian connectivity partners, it is important to examine the role the telecommunications regulator plays in the market. The regulator sets the rules of the game for commercial operators and can be an important ally for humanitarian connectivity projects, especially because they create and enforce requirements around universal access. To understand their role in the context of forced displacement, and aspects of the regulatory environment in which commercial providers operate, the following five categories help structure relevant questions:

1. *Regulatory Capacity:* In general, how effectively does the regulator govern the business activities of connectivity companies? How well staffed is the regulator? Does it have accurate and current information on licensed companies’ coverage, services and business practices? Does it allow for multiple regional operators to use the same spectrum?
2. *Coverage:* Does the regulator have any coverage requirements? In many countries, MNOs’ spectrum licenses include requirements for distributed coverage throughout the country. In practice that has alternatively meant that a certain percentage of the country’s population, its territory or a combination thereof must be covered by a signal. It is less common for regulators to focus on population percentages, because companies can too easily meet the requirements by focusing on providing coverage in urban areas.

²⁴ Specifically this refers to how data is captured, stored and transferred and how also metadata can paint pictures of people’s lives, based on their usage of telecommunications services.

3. *Infrastructure sharing:* Are there infrastructure sharing requirements? Many countries have passed laws requiring mobile network operators to share communications infrastructure (mostly towers).

4. *Impartiality:* Does the regulator treat all operators equally? Are systems and procedures in place to ensure its impartiality i.e. measures for transparency? If there is a state carrier, does the regulator continue to have an interest in supporting its viability or control over telecommunications resources?

5. *Universal Service Fund (USF):* Does the country have a fund that works reasonably well, such that you could consider proposing part of it be used for humanitarian purposes? USFs are set up to bring access to the underserved populations and locations that have been left out by local operators. Regulators charge a certain percentage of MNO and ISP revenue on top of their taxes and pool these funds to make investments that improve a country’s overall connectivity situation. Examples of investments include capital costs, such as laying fiber to underserved areas and operational costs, such as subsidies for services rendered to or in underserved areas.

Regulatory Innovations

If not specifically structured with it in mind, mobile spectrum licensing practices can limit the scope for innovations in last-mile connectivity. This is because they license spectrum at rates that only large companies aimed at providing service at the national level can viably meet. In connectivity expert Steve Song’s words, they can potentially be “a firewall to competition” and “a disincentive to rural access”.²⁵

Spectrum licenses for social use

There are positive practices and innovations that humanitarian organizations can utilize as anchor points in the discussions with telecommunications regulators, specifically the case of Mexico, which is a world leader in regulatory innovation. In 2015, the country’s Instituto Federal de Telecomunicaciones (IFT) allocated “2 x 5 megahertz of spectrum in the 800 MHz band for ‘social use’”, requiring that it be “used to service communities of 2,500 people or less, or communities located in a designated indigenous region or priority zone.”²⁶ And in December, 2019, the Mexican government decreed that operators serving these communities no longer have to pay taxes on the licenses they received.²⁷ More than any other organization in Mexico, *Rhizomatica* has successfully developed community GSM networks. The organization is expanding outside of Mexico and open to advising other community GSM efforts.

As of January 2020, Uganda is pursuing similar approaches. The country’s regulator issued new license categories, including regional licenses, public service license and one “to provide

²⁵ “Spectrum Auctions Are Killing Competition and Failing Rural Access” <https://manypossibilities.net/2019/04/spectrum-auctions-are-killing-competition-and-failing-rural-access/>

²⁶ “Unleashing Community Networks: Innovative Licensing Approaches” ISOC, <https://www.internetsociety.org/resources/2018/unleashing-community-networks-innovative-licensing-approaches/>

²⁷ “Concesiones de uso indígena están exentas de pagar por espectro” <https://www.eluniversal.com.mx/cartera/concesiones-de-uso-indigena-estan-exentas-de-pagar-por-espectro>

communal access”.²⁸ This first for Africa is welcome news for proponents of community networks. Specifically Uganda has an extremely positive policy relating to refugees and as such UNHCR has invested in further exploring the potential for community networks, in partnership with the Association for Progressive Communications (APC).²⁹

One compelling model involves the licensing of community GSM spectrum for use by any town, village, etc. as long as no one’s signal interferes with anyone else’s. One can envision a non-profit organization that helps communities set up and operate GSM equipment and related systems, supported by revenue sharing agreements. For any approach, if this type of license were authorized in a country, GSM equipment such as that produced by OpenCellular³⁰ is getting inexpensive enough to make community GSM networks economically viable.

Using Wi-Fi, an unlicensed spectrum, for community networks

Otherwise, community networks mostly involve Wi-Fi, rather than GSM, and some application of mesh networking, a technology using several routers spread over an area that share connectivity amongst each other and with users. Whereas community networks may see a high level of community ownership over network management, some struggle to achieve commercial sustainability or reliability. One common challenge is the lack of special provisions for community networks in telecommunications regulations. APC and the Internet Society (ISOC) have been leaders in studying and supporting community networks around the world. APC published comprehensive research on community networks in 2018 called “Bottom-Up Connectivity Strategies: Community-led small-scale telecommunication infrastructure networks in the global South”, and recently collaborated with a new report looking at the application of community-networks in forced-displacement contexts.³¹

Understanding Commercial Connectivity Providers

It is essential to understand the practical and commercial differences between mobile (i.e. driven by an MNO) and internet connectivity (i.e. driven by an ISP) in a forced displacement context. On one hand they can be defined by whether connectivity is accessed individually and privately, or communally, with other people around. Generally, MNOs provide individual connectivity experiences and ISPs provide communal experiences, since refugees access computer-based internet in locations like UNHCR’s Community Technology Access Centres (CTAs) as opposed to have individual-level direct internet contracts with ISPs. This document organizes the division by MNO and ISP as humanitarian connectivity partnerships are formed with companies whose services generally connect to, respectively, mobile phones and computers, devices with distinct user experiences. Incidentally, this division does take into account the fact that MNOs are in fact ISPs, since they provide mobile data services. Nevertheless, connectivity programs with MNOs can differ from those with ISPs, making the high-level explanation below worthy of discussion:

²⁸ “Approved new Telecom Licenses”, <https://uccinfo.blog/2020/01/27/approved-new-telecommunications-license-categories/>

²⁹ See the report “Community-led Connectivity” at <https://www.unhcr.org/innovation/community-connectivity/>

³⁰ OpenCellular (OC) is an open source access platform with a focus on enabling rural connectivity. For more information go to: <https://oc.telecominfraproject.com/>

³¹ <http://www.unhcr.org/innovation/connectivity-for-refugees/>

Mobile network operators (MNOs)

MNOs such as MTN, Vodacom, Orange, Digicel, etc. offer voice, SMS, USSD³², data and other services such as mobile financial services. The complexity of services, especially mobile financial services, differs by country. For example, credit and insurance services accessed via mobile are only offered in some countries. This differentiation may be a commercial decision from the operator in question, or it may be linked with the specific regulatory environment in the country in question that hampers such service provision.

While MNOs earn revenue from these services in different ways, not all services are used by all customers. One recent study found, for example, that among users in six lower-middle income countries, almost 100% of mobile phone users had used their phones to make at least one phone call while only 50% had ever sent a single text.³³

The vast majority of individual user accounts in developing countries are pre-paid. For example, GSMA Intelligence predicted by the end of Q1 2020 Egypt would have 83,767,395 prepaid accounts and only 12,497,867 post-paid or contract accounts; 87% pre-paid. At the same time in Côte d’Ivoire 32,887,731 out of 33,183,583 mobile accounts would be prepaid; 99%. Prepaid accounts have typically involved people purchasing airtime via single-use scratch cards, though increasingly people use mobile money to top up their pre-paid accounts.

One important unit of measurement for MNO commercial performance is average revenue per user (ARPU). This is the total monthly revenue divided by the number of users. MNOs orient much of their strategy around increasing their ARPU by increasing usage of their network and services, and overall profit by combining this with cost reduction. When engaging with humanitarian actors or others around any specific project or initiative, many commercial questions the operator may have will in many cases be around if and how this affects their ARPU. The connectivity offered by MNOs is facilitated by physical infrastructure of cells and antennae called “base stations”, all which require connection back to the companies’ core network. This connection between a base station and the core network is called backhaul. It usually takes the form of fiber optic cables, line-of-sight microwave connections or via satellites.

MNOs place infrastructure in locations where they determine there are enough people, either residents or passers-by who will be “covered” by the signal from the tower. The signal itself travels straight, and is often described as “line of sight”. This is why towers built tall and placed on the highest nearby—and why, if a tall hill separates you from a cell tower, you will have little to no signal. This basic requirement for proximate infrastructure has in multiple cases led UNHCR to work with MNOs to have towers installed in refugee locations.³⁴ MNOs operate by licensing electromagnetic spectrum from a national government, often the Ministry of Communications. Within a spectrum band, they will use a signal frequency that connects base stations (a common term for cell towers) to phones, usually 900 MHz or 1800 MHz. Generally speaking, 900 MHz is better for longer distance

³² USSD = unstructured supplementary service data. It is information sent in text format over a live connection. It can be used for mobile money, location-based services and more.

³³ “Digital Lives: Meaningful Connections for the next 3 Billion” https://pathwayscommission.bsg.ox.ac.uk/sites/default/files/2018-11/digital_lives_report.pdf

³⁴ <https://www.unhcr.org/innovation/rebuild-connection-displacement-uganda/>

and penetrating land objects like trees, and 1800 MHz is better at sending larger amounts of data over shorter distances. Whatever the frequency, if a mobile phone doesn't support the frequency, it won't be able to connect with the network. Most modern phones (also called "handsets") are quad-band, meaning they work with the most common four frequencies of 850/900 and 1,800/1,900 MHz. But, it is important to be aware of potential incompatibilities.

The speed of mobile internet data available varies by company and by country. Typically, an MNO will pay a very high price for spectrum license lasting decades, with the aim of recouping the cost over several years. A spectrum license is only for a specific band of frequencies (often for a specific data rate, for example 3G); every time a government decides to auction a new band (with corresponding data rates; 4G, 5G...), MNOs will have to purchase the licence, usually via auction. While sometimes governments auction off spectrum, allowing new MNOs to enter the market, sometimes they offer new spectrum only to existing companies.

A country's market conditions affect the timing of spectrum license auctions. In several cases, when governments have wanted to auction new spectrum (and earn the corresponding amount of revenue, which for many countries is quite significant), operators have been reluctant because they are still working to realize the benefits from their existing spectrum licenses and, more importantly, they don't believe the penetration of smart phones and number of users in the market could recoup the cost of a further investment in spectrum and equipment. In most cases however, competition between Mobile Operators is strong, and as such the competition in such licences auctions is similarly intense. Sometimes out of a desire for their countries to appear modern and with the times, governments, such as Togo, may forego prolonged spectrum auction processes and unilaterally issue spectrum licenses to MNOs, so they can immediately begin offering 4G or 5G services.

Governments issuing spectrum licenses often include requirements for covering a specific percentage of a country's population in the attempt to work towards universal access. In Uganda, for instance this is something that is being explored as part of a review of the licensing framework, including a provision for coverage of 95% of geographic area.³⁵ Potentially this gives them an incentive to collaborate on humanitarian connectivity projects. Some organizations like the Dynamic Spectrum Alliance (DSA) and the Internet Society (ISOC) believe that innovating around spectrum use, provides a better pathway to universal access. While the DSA seeks to utilize unused spectrum for commercial internet connectivity service provision, ISOC would like for regulators to issue affordable licenses to community networks.

In most towns where MNOs have signal, they have a local presence, usually via a small office or franchise selling their scratch cards, branded phones and usually providing mobile financial services, alongside a number of local agents operating both from the store and booths. While the shops may sometimes appear modest, the ability to send, receive and store money is transformational for individuals and businesses in rural communities. Unfortunately, still not all MNOs provide financial services such as mobile money, or are in partnership to facilitate such services.

³⁵ Accessed on 16/03/2020 p18, Consultation Paper - The Proposed Review Of The Licensing Framework For The Telecommunications Sector In UGANDA <https://www.ucc.co.ug/wp-content/uploads/2019/04/PUBLIC-CONSULTATION-PAPER-ON-TELECOM-LICENSE-05-04-2019...pdf>

Regarding the sending and receiving of voice calls, MNOs need to have interconnection agreements with each other, which include setting up the technical means of connecting or "terminating" calls originating from one network and connecting to the other. If they don't have these, it is not possible to call between networks. Given that people choose to use different companies' services this leads to the situation where people have to carry multiple phones, or phones that are built to use multiple SIM cards. In South Sudan, for example, companies inconveniently did not have interconnection agreements for several years past independence. This necessitated carrying up to three sim cards - and often three cell phones - in their pockets at the same time, one per carrier.

More than 90% MNOs in the world today use the GSM protocol for their signal. "GSM" is used commonly to mean a mobile signal or network. Most of them are members of the GSMA, a global trade association based in London, which manages the GSMA Intelligence portal that (at a fee) provides detailed information on member performance by market, and has a Mobile for Development unit that does work on humanitarian connectivity and has collaborated with UNHCR. The organization also has a Mobile for Humanitarian Innovation Fund under its Mobile for Humanitarian Innovation Programme and has promulgated the GSMA Humanitarian Connectivity Charter. According to the GSMA, "there are currently 156 mobile network operator (MNO) signatories of the Humanitarian Connectivity Charter, operating in over 108 countries. Comprised of three principles, focusing on preparedness, scale and collaboration, signatories of the Charter commit to support improved access to communication and information for those affected by crisis in order to reduce the loss of life and positively contribute to humanitarian response." Fortunately, the GSMA's coverage of forcibly displaced persons is a core focus of their £15.5 million Mobile for Humanitarian Innovation programme.

Internet service providers (ISPs)

ISPs offer internet connectivity as their main service, either by a physical or wireless connection. An ISP that connects customers with a wireless connection is called a wireless ISP, or WISP. To be clear, since MNOs offer mobile data, they also are ISPs; since ISPs offer internet access, but not GSM access, they are not MNOs.

The infrastructure and user devices are similar, but different. The range of a regular household Wi-Fi signal can be as far as 50 meters indoors and 100 meters outdoors, but usually is significantly shorter. A regular GSM signal on the other hand reaches much farther—typically around 15 km. Technically the range is only limited by signal strength and tower height and the ability of a device to return the signal. One long-range Wi-Fi experiment in Italy achieved a signal range of 304 km. Practically, however, commercial considerations lead MNOs to organize their infrastructure so that its signals cover comparatively dense populations.

Both MNOs and ISPs in developing countries require a connection with developed countries' internet, because that is where the vast majority of servers storing and managing online content and services are located. If a country does not have a physical connection, such as a landing station connected to an undersea cable, its internet speed, cost and reliability will present serious challenges to partnership formation.

Understanding Evolving Technology Options

Any humanitarian connectivity project with either an MNO or an ISP will seek to use the most useful and cost-effective technologies. Given the ever-evolving nature of technology, it can be useful to keep track of innovations while they are at earlier stages, given that the potential of being first to deploy a new technology can play a key role in convincing private connectivity providers to enter into partnerships with humanitarian actors. Some technologies that appear promising at the time of this document's publication include:

Long-range Wi-Fi

Also known as Wi-Fi over long-distance (WiLD), the technology presents a type of backhaul useful in rural areas including those with comparatively smaller budgets. The technology can reliably connect devices several km away for price cheaper than microwave, satellite or LTE. The subtle implication is that distance between project locations can be greater and, it is relatively easy to connect individual project participants are randomly located, such as in a refugee settlement. It is best for locations without any other Wi-Fi signal, so interference is not an issue. The solution can be good for peri-urban locations. Manufacturers include [Ubiquiti](#), Antenna World's [Technical Antennas](#).

OpenRAN

Open Radio Access Networks ([OpenRAN](#)), use open software to run cellular network equipment. Currently when MNOs sign a contract with a network hardware company, they can only use that company's software and technical support staff. When MNOs enter into contracts with these companies, the sticker price of the actual equipment might seem appealing. Yet, the high total cost of ownership has frustrated MNOs. The [Telecom Infrastructure Project \(TIP\)](#)³⁶ efforts are bearing fruit in the case of OpenRAN: Where before Huawei, Ericsson and others dominated the telecommunications infrastructure market, OpenRAN is providing space for smaller companies such as [Parallel Wireless](#), [AltioStar](#), [Fairwaves](#), [Vanu](#) and [Mavenir](#) and other new market entrants to produce equipment using OpenRAN software for big customers such as Vodacom and MTN. The potential implication of developments of OpenRAN is that it will drive down costs through competition, particularly for smaller scale base stations, and as such it will be more affordable for a humanitarian connectivity project to pay for a new node in a cellular network.

Satellite connectivity

To date, while satellite connection rates have been falling for several years and are expected to continue to fall³⁷, they are not widely used by average consumers and currently don't present a sustainable solution for the refugees or other beneficiaries of humanitarian connectivity projects. Even with their trend of decreasing prices, they are still very expensive compared with terrestrial networks. They often are practical for connectivity UNHCR operations in rural last-mile locations, but as of yet have not been a proven option for refugees paying for their own connectivity.

³⁶ TIP is an engineering-focused, collaborative methodology for building and deploying global telecom network infrastructure, with the goal of enabling global access for all.

³⁷ "Pricing The Satellite Markets", Northern Sky Research <https://www.nsr.com/pricing-the-satellite-markets/>

Several companies are racing to launch internet satellite constellations in varying amounts and orbits, that have the potential to disrupt the market significantly within the coming years. Beyond efforts such as [Starlink](#) and Amazon's [equivalent](#) large scale satellite network - with satellite connectivity coming down to specific access terminals, some organisations are working on a connectivity solution that will see regular mobile phones connecting directly to satellites without the need for a special device or service plan, by attaching cellular antennas to the satellites.³⁸ This differs from current satellite telephony, which requires bespoke devices and service plans. In this case customers would connect via their existing MNO in a country - with the satellite providing an alternative infrastructure modality. The user will continue to use their current provider, without knowing the connection has been routed by a third party. Innovative approaches such as these will support existing providers reach better coverage in last-mile areas.

Airborne connectivity

Multiple companies have put base stations on blimps and balloons into the stratosphere to provide a GSM signal to wider areas. [Altaeros](#) is one company operating blimps, though the most well-known company is Loon, which was announced as a project by Google X in 2013 and spun off into its own company in 2018³⁹. Loon operates massive polyethylene balloons at 20 km altitude. The service currently is working on connecting people in Peru's Amazon region and is pursuing a commercial trial in Kenya, in partnership with Telkom Kenya.

Tower Companies and active infrastructure

A long-term trend in mobile networks has been the divesting of infrastructure. MNOs have been selling their towers to tower companies and leasing them back, because this reduces their operating costs and gives them more flexibility. Tower companies, most of which are members of the [TowerXChange](#) trade association, are looking for ways to monetize their infrastructure by placing more equipment on the towers. This interest, combined with the fact that the towers already have a backhaul connection, could mean they could be used for community Wi-Fi deployments. Tower companies are also deploying "active infrastructure", equipment which can route the signals of multiple MNOs. The use of active infrastructure effectively means MNOs can start or stop offering service in a location by signing an agreement with a tower company. Depending on the specifics of a location, this ability could enable easy deployment of humanitarian connectivity, and hold potential for an innovative collaboration model.

New generations of cellular technology (5G)

As a technology, 5G does not represent one step of advancement past its predecessor in the way that 4G surpassed 3G. Instead, 5G is a technology, operating at a speed that is meant to usher in widespread use of technologies, including internet of things (IoT), smart sensors, self-driving vehicles, etc. The radios sacrifice range for high bandwidth, meaning that a lot more of them are needed to cover a population. For these reasons, it will likely be several years before 5G becomes relevant to humanitarian work, and specifically non-urban areas. Also, it will be some time

³⁸ Companies include Lynk and AST & Science

³⁹ <https://loon.com/>

before 5G-enabled devices are widespread. Meanwhile, different MNOs are emphasizing different connection speeds for different reasons. Whereas Canada's Rogers network plans to turn off 2G on December 31, 2020, in India, Bharti Airtel is expanding its 2G and 4G network, while shutting down its 3G services.⁴⁰ The United Kingdom is following a similar path of keeping 2G systems active but discontinuing 3G.⁴¹ Ultimately, when exploring what type of cellular technology to utilise in a potential collaboration, it will very much depend on the needs of communities, potential levels of usage (that hinges on ability to pay for services) as well as other factors such as spectrum.

Further Considerations

In this section we have explored a number of existing and potential options that could be utilised in an intervention bringing connectivity to forcibly displaced populations and their hosting communities. In all there will be a wide variety of factors that need to be taken into account when determining what the most suitable technology is for any intervention. All the aforementioned factors in previous sections, alongside the contextual dynamics and potential to pursue different technology options with partners are also limiting factors.

Finally, this landscape is evolving continuously with disruptive technologies emerging frequently. Humanitarian actors engaged in the pursuit of facilitating access to connectivity would be advised to stay abreast of the evolving landscape to inform interventions.

40 "Airtel to shut down 3G network across India by March; evaluates opportunities on fibre monetisation", Economic times <https://economictimes.indiatimes.com/industry/telecom/telecom-news/airtel-to-shut-down-3g-network-across-india-by-march-evaluates-opportunities-on-fibre-monetisation/articleshow/70499416.cms?from=mdr>

41 <https://www.techuk.org/insights/reports/item/16165-the-potential-impact-of-switching-off-2g-in-the-uk>

Part 2: Selection and Planning

Evaluating a Potential Commercial Partner

In many, if not all, humanitarian situations, humanitarian organizations and connectivity providers have overlapping interests which offer the potential for responsible and effective win-win partnerships, where a company will earn additional revenue and refugees would receive tangible benefits as a direct result of the collaboration. By employing a combination of common sense and creativity, these partnerships have the potential to achieve longer-term sustainable connectivity than approaches characterized by short-term donor-funded temporary solutions. To create these partnerships that provide services to refugees, humanitarian actors need to have a strong understanding of their potential MNO or ISP partner. This requires gathering in-depth information, which are broken down into distinct sections below, each with an example of relevant questions to explore when evaluating the potential partner. These questions should inter alia help you understand their position and trajectory, openness to collaboration and how they would behave in a partnership.

1. Business Status

Firstly it is important to understand the partner in question. All aspects of its business are relevant to consider for partnership. The impact of everything from its legal standing and incorporation through to its general business practices, network of subsidiaries and partners can have an impact on the dynamics of collaboration. The clearer the picture of the organisation itself, the easier it will be to understand the position, motives and interests of the partner. The following areas warrant scrutiny and evaluation:

- a. *Ownership*: Who owns them? Do you have any ethical concerns with the activities of the owners? Do any high-ranking government officials have a significant stake? Does the company's ownership ever lead to non-competitive behavior?
- b. *Business Practices*: What is the company's reputation? Is it considered to be well-run? Has the company ever created any partnerships with development or humanitarian actors? If so, were these partnerships successful?
- c. *Relationship with government*: Is the company in good standing with the government? Has the company criticized the government in the press? Has the government ever sued or fined the company for any reason? Does the company have any major government contracts?
- d. *Market penetration*: What percentage of the market does the company have? Are its customers primarily urban-based, or are they evenly distributed around the country?
- e. *Philanthropy*: Does the company engage in any philanthropic activities? Does it have a foundation? If so, what are the priorities of its foundation? Whom does it fund? What is the scope of its funding?
- f. *Humanitarian experience*: Does the company have experience engaging with humanitarian situations? Has it ever trained its staff in how to engage with people who have been forcibly displaced?⁴²

42 For a good example of the type of training content an MNO could provide its staff (likely in coordination with a humanitarian organization) review "Mitigating Risks Of Abuse of Power in Cash Assistance", a joint publication by UNHCR and WFP. <https://www.unhcr.org/5c7925954.pdf>

- g. *Equal opportunity*: What are their hiring practices? Do they hire as many women as men? Do they discriminate against any groups?
- h. *Trajectory*: How long has the company been operating in the market? How is the company doing in the market, vis-à-vis its competitors? Is its business growing? Is it losing market share?
- i. *Communications*: How strong and sophisticated are the company's communications personnel and activities?
- j. *Transparency*: Does the company publish financial information on performance, internal policies, growth strategies or visions, what it prioritizes in partnerships?
- k. *Network*: Is the company a part of an international group, or is limited to just one or a few countries? Often Group level engagement can result in an organisations support for humanitarian activities at country level. Understanding how the different dynamics work between Group and Country level is vital for understanding how to make things move on the ground.

2. Technology

Building off the previous chapter on evolving technology, it is important to look at what technology the specific partner has access to, or which is does not, and why. It is not necessary to be an expert in all relevant technical areas; common sense is enough. The partners under consideration should be able to provide thorough background information and explain it all to non-technologists. Relevant areas for scrutiny include but are not limited to:

- *Performance*: What is the fastest connection speed the company offers? What rate of uptime is it guaranteeing the regulator and its customers?
- *Footprint*: Where in the country does the company offer service(s)? Where does it have a physical presence?
- *Forms of connectivity*: If they are an MNO, which technology do they use to broadcast their signal? If they are an ISP, do they offer service via fiber? A wireless signal?
- *International connectivity*: Where do they get their connectivity from? Is it direct from an undersea cable? Are they forced to buy connectivity from a state-owned operator? Are they only able to connect to the outside internet via satellite?
- *Technology Partners*: Whose technology runs their networks? Which satellite services do they use? How does this compare to others in the market?

3. Service Offerings

Linked to the technologies available to the company are the specific service offerings that either they have in place or are planned in the near future:

1. What are the costs of normal dialing and messaging services?
2. Do they offer any of the following services?
 - a. Mobile financial services
 - i. Mobile payments
 - ii. Bill payments
 - iii. Savings accounts

- iv. Loans
 - v. Airtime purchases
 - vi. Out-of-network transfers
 - b. Interactive voice response (IVR)
 - c. Bulk SMS / MMS
 - d. Short codes
 - e. USSD usage
 - f. International VOIP calls
 - g. Online retail
 - h. Online account access
 - i. Internet cafes
 - j. Advertising, including via SMS or IVR
3. Do they sell customer service data?
 4. Do they sell devices under their own brand?
 5. Are third-party content (news, sports, entertainment, ring tones, etc.) services available?
 6. Do any of the devices they sell offer character choices not available on other networks? *(Sometimes MNOs invest in phones for specific markets that support characters/alphabets not supported on mass-market phones.)*
 7. What feedback mechanism do they have? Do customers have recourse to complain?

A comprehensive conversation with the right individuals at an operator would answer most if not all of these questions. Usually these are people in charge of strategy or operations, not those who work in corporate communications or corporate social responsibility. This is because the collaboration likely to provide the most benefits to refugees will also support a company's business strategy.

Some good information resources on potential commercial partners include: GSMA Intelligence; GSMA Mobile for Development reports; USAID's Digital Inclusion Team [publications](#); [Developing Telecoms](#); Telegeography's [CommsUpdate](#) and Steve Song's [Awesome Connectivity Info](#).

Models and Approaches

There are many different reasons an MNO or ISP would be interested in partnering on a humanitarian connectivity project. Generally, these include increased revenue by adding new locations and customers; positive exposure from appearing to be a responsible corporate actor and the opportunity to experiment with new technologies that support all of the above.

For all models, it is important to consider the network effect when evaluating the economic viability of a location of potential communications infrastructure. If you only count the local population and guess the average disposable income of people in that place, you will fail to appreciate the amount of revenue created by calls coming into the location where you have set up connectivity. The majority of revenue may indeed be generated by consumers who live elsewhere.

In this section we outline different business models and related approaches that could harness the private sector motivations listed above. They are listed separately, but many of them could be deployed together.

Models for Mobile Operator Service Expansion

1. Expansion Model

There are generally two different ways to extend connectivity to refugees by utilizing an MNO's existing technology. First, a humanitarian organisation such as UNHCR could request or advocate that an MNO place a tower in a refugee location, pointing both to the market viability and corporate social responsibility arguments. This approach could involve providing the MNO with minimum usage guarantee, so that a site has some measure of guaranteed revenue.

UNHCR has successfully partnered with MNOs to extend coverage to refugee camps and settlements in many locations, including Uganda, Tanzania, Kenya, Jordan and others. Its efforts have even caught the attention of the Financial Times, which reported that "companies are starting to realise displaced communities represent untapped markets."⁴³

The expansion model is by far the least risky for the MNO, because it most resembles business as usual. However, some may choose not to construct a base station from day one, deploying instead a cell tower on wheels (COW) so that they can test demand for connectivity and provide it to the displaced as quickly as possible.

Second, a humanitarian connectivity project might be able to engage an MNO to commence service in a location if it purchases and installs a base station using the brand and type of equipment that MNO is already using, or if it covers other costs associated with establishing a new site. It would be like buying a transportation company a new bus if they agreed to service a new route. It is often the case that MNOs have extra equipment sets in storage

In both cases, an MNO might call upon a humanitarian actor to help negotiate usage of the land with local authorities, rights of way, or access to power sources.

In general, a humanitarian agency can consider pursue a partnership with a specific country office, or with the company at the group (the multinational) level.

2. Innovation Model

Under this model, the partnership focuses on introducing new technology into a MNO's network to enable connectivity. The humanitarian partner, with its displaced communities in mind, brings the new technology to the table. Examples include new base station equipment for MNOs and high-capacity caching equipment for a WISP.

In addition to clarifying whether the innovative technology in question is developed and tested enough to be ready to be deployed within a network, it is important to evaluate how much time it will take to integrate the new equipment. Integration of new GSM equipment into an MNO's network is like transplanting an organ: It takes a specialist to introduce and integrate the essential new

⁴³ "Telecoms operators dial in to refugee markets", Financial Times, September 24, 2018. <https://www.ft.com/content/753cba1e-9bef-11e8-88de-49c908b1f264>

component into the system. It also takes a significant amount of time to integrate new equipment into an MNO's core network, even if they already use that brand of equipment.

It is also critical to consider the implications for backhaul costs for any new technology introduced at a site. (Backhaul is the means by which a base station, wireless access point, etc. connects to a company's core network.⁴⁴) For example, if a humanitarian organization were to receive donated 4G base station equipment for a humanitarian connectivity project, it might not work out. An MNO would likely be resistant to integrating the tower, both because they have to spend the same amount of time integrating a single unit of a new technology product as they would integrating a thousand units from one product line, and because the cost of backhaul affects the profitability of the speed (2G, 3G, 4G). For newly connected areas, they are less likely to earn the revenue they need for the cost of backhaul (for instance via satellite) for higher data speeds.

It is worth noting here that turnkey solutions can be appealing, but they tend to oversimplify technical needs. For example, BaiCells' [Skycell Drones](#) and [Nokia Drone Networks](#) seem like exciting options, but these are short-term technical solutions designed to be appealing by appearing easy to deploy. They are in fact much less appealing to commercial partners.

One challenging aspect of the Innovation Model is that it requires a humanitarian organisation to identify, understand and advocate that a commercial partner integrate a new technology, areas of expertise which often fall outside of traditional humanitarian skillsets. The potential of this model highlights the importance of humanitarians investing in staffing with specific technical skills to support such innovative approaches. Also, relevant innovations aren't constantly being created; the technology and the timing need to be right. Even considering these concerns, however, it is important to remember the creator of a new connectivity technology will inevitably be looking for an implementation partner who may bring resources to the table. By humanitarian actors positioning themselves as the organization that can facilitate the deployment of a funder of hardware manufacturer's equipment and fulfillment of its vision or strategy, they will likely receive sufficient support from the commercial partner to follow through with deployment. Humanitarians should avoid promoting a technology for its own sake and focus on what will best support a sustainable commercial deployment.

3. Demand Creation Model

This approach focuses on supporting activities that encourage the use of connectivity to ensure a site is profitable. For example, a humanitarian project could focus on supporting livelihoods activities and in turn services that help make the case for a commercial connectivity partnership in that location. Since, in addition to revenue from calls, text and data, MNOs earn significant revenue from mobile financial services, humanitarian actors themselves can contribute to demand through leveraging cellular networks for their cash programming via for instance mobile money.

In the not-too-distant future, off-grid electricity services could support the Demand Creation model, because these services are typically operated on the pay-as-you-go (PAYG) model, where consumers top up their accounts using mobile money. Indeed, electrical power has a symbiotic relationship with last-mile connectivity, because cell towers and Wi-Fi routers require power to function and

⁴⁴ For explanation of this and other connectivity terms, consult UNHCR Innovation's Brief Connectivity for Refugees Glossary https://docs.google.com/document/d/1aWb9mAF01cf_WAgO-zQq8J6n06eXQRu6rLwHpVM_SWU/edit

the fees collected by MNOs for mobile payments help keep both functioning sustainably. And, in addition to the intentional coupling of connectivity and power business models, project designers often build in extra electricity capacity, so that either device charging business can be set up next to the connectivity equipment, or provider power to neighboring homes or businesses. For more information about off-grid, pay-as-you go electricity, one might consult the strategies and approaches highlighted in the [UNHCR Global Strategy for Sustainable Energy](#).

4. Anchor Tenant Model

This model involves finding a local institution such as a school or health clinic that has both a need for connectivity as well as its own budgetary resources. If this institution can be convinced to allocate resources for connectivity, its individual demand could provide enough base income that an MNO or ISP would be enticed to install infrastructure there. In the Americas, UNHCR pursued the anchor tenant model not only on a resource basis, but also from an ownership perspective with local authorities. It actually got support for it because the solar provided would save local partners costs for their other needs. If successful, the joint UNICEF-ITU GIGA initiative, which is focusing on connecting all schools in Central Asia, Eastern Caribbean States and East Africa, will function according to the anchor tenant model.”

Models for Service Expansion through ISPs

1. Community Wi-Fi Model

This model involves working with a WISP to install a Wi-Fi router in a refugee location and determining a system of payment for usage, often voucher systems similar to those installed at airports. While a humanitarian organization may have the budget to provide free Wi-Fi on a temporary basis, this approach is often not sustainable. If commercial Wi-Fi is offered from the very beginning, it will be more likely to become sustainable. Where there are specific humanitarian needs that fall outside a commercial offering, one solution is to make special arrangements for those who cannot afford to connect regularly, or those with specific needs based on assessed level of vulnerability.

Sometimes WISPs are unused to interacting with humanitarian organizations and yet, when links are established, are more than ready to work on creative solutions. Since satellite backhaul works indiscriminate of its deployment location in a country, for them installing a wireless access point in a refugee location shouldn't be that much different than for any of their other customers. WISPs can even set up two Wi-Fi routers in one location, where one provides connectivity for organizations (higher potential usage / revenue) and the other for refugees and the host community. Their business model allows WISPs to scale cautiously, one customer at a time, deploying their hardware on a demand basis.

A variation of this involves the use of mesh networking technology, where all Wi-Fi routers receive and share a signal. This approach does require, however, a high level of patience and technical expertise, because most commercial providers will likely want to sell more standard forms of connectivity and a separate organization would have to facilitate deployment of the network itself. The most successful mesh network deployments have in fact been in developed countries.

A good resource for anyone interested in learning more about deploying mesh networks is [Wireless Networking in the Developing World](#)⁴⁵. Also, UNHCR and the Alliance for Progressive Communications (APC) have recently released relevant new research on community networks in forced displacement settings.⁴⁶, building on their [Bottom-up Connectivity](#)⁴⁷ Strategies research.

2. Community Wi-Fi Model with Refugee Entrepreneurs

Setting up community Wi-Fi through a commercial partnership can meet the needs for meaningful connectivity. Yet, by involving refugees as resellers of Wi-Fi, a project can achieve much more for refugee livelihoods. This approach would involve using something like [Express Wi-Fi](#) software, another product created under TIP. Express Wi-Fi is an essentially an Android App that connects to an ISP's billing system. It is used to generate one-time passwords for Wi-Fi usage. People with their own devices pay cash to a reseller for a certain amount of browsing time. The reseller collects earns a fee for each sale. According to Facebook, Express Wi-Fi is “a comprehensive Wi-Fi platform that partners can leverage to better manage and grow their Wi-Fi offering.” It is currently in use in several countries such as Nigeria, Kenya, India, Tanzania, Ghana, Nepal and others. The Express Wi-Fi team is open to commencing service in new locations.

Both Wi-Fi models can take advantage of a technology called “local caching”, which is the ability to store downloaded content on a server located at the same place as wireless router. Once content is stored locally, an individual can stream it directly from this cache to their device, without having to re-download it via satellite. This saves costs and improves user experience. Further, educational or social service content can be pre-loaded onto the local cache and provided for free. Content consumption can be remotely managed and monitored by platforms such as the one provided by [Bluetown](#). For any of these innovations, it is useful to know what is inspiring potential private sector partners at the moment, in case anyone investing in technology is also investing in its deployment. It is worth learning who is interested in what innovation, who is spending money on innovation labs or challenges, who is trying the hardest to catch up with their competition.

Organizational interest in large-scale connectivity projects comes and goes. Google used to be active in examining the potential of white space spectrum for internet access, but have re-prioritised their efforts in the connectivity space. Microsoft has had sustained interest in using white spaces but shifted its connectivity grant program from an international to primarily a domestic focus, before returning again to international work through a project with Bluetown in Ghana. Facebook has been investing hundreds of millions in connectivity innovations, especially since the launch of TIP⁴⁸, though only ended up funding one round of OpenCellular grants. UNICEF's Office of Innovation recently [announced](#) an initiative named GIGA looking to connect all the world's schools to the internet using the schools as anchor tenants enabling internet service provision to the entire community, with the support of corporate partners such as Softbank⁴⁹. Meanwhile, smaller initiatives utilizing existing technology continue to make a real difference in rural and remote locations.

45 <http://wndw.net/book.html>

46 <http://www.unhcr.org/innovation/connectivity-for-refugees/>

47 https://www.apc.org/sites/default/files/bottom-up-connectivity-strategies_0.pdf

48 Telecom Infra Project <https://telecominfraproject.com/>

49 <https://visionfund.com/social-impact>

3. UNHCR Community Technology Access Centres (CTAs)

For several years, UNHCR has managed several Community Technology Access Centres (CTAs) in dozens of locations around the world. They have served to provide communal internet access to thousands of refugees, who usually pay a small fee for the service. CTAs serve as more than simple internet cafés, however. It is in fact the other services and activities that form the basis of successful CTA business models. Indeed, the most financially sustainable centers found ways to generate revenue from activities such as renting the space to third parties, phone charging or organizing and charging for computers or other livelihoods-related courses.

Further Opportunities

Community Cellular

In the right conditions, it might be useful to deploy a community cellular network, particularly to enable intra-camp or intra-settlement communication, because calls can only be made locally, via infrastructure installed by a community. It does not interconnect with MNOs, however. The technology that enables cell phones to make calls to other phones within range of the same base station is called “local switching”.

The location of a community cellular network should be determined by looking at where there is no commercial alternative. This process will be made easier if MNOs would have no objection to a community running its own local network and do not see it as potential competition. Also, it is necessary to get permission to use spectrum from the national telecommunications regulator, which may grant a social purpose license. This process is complex and time consuming and as such a partnership with an MNO to utilise their spectrum may be more suitable.⁵⁰

A variation would be for the MNO to allow for free local calls within refugee settings. This would be possible if they configured specific base stations to allow for free local switching.

Urban Connectivity, a Unique Challenge for MNO or ISP partnerships

While the primary focus of this document is on connecting refugees in locations lacking any form of connectivity, humanitarian programs should also examine how partnerships with MNOs or ISPs could provide meaningful connectivity in urban or peri-urban locations, because, according to UNHCR figures⁵¹, 55% of refugees live in urban areas. This is an entirely different exercise, in terms of business models and technologies, but deserves consideration because, even though refugees might be located in a location with a strong signal, it doesn't mean they have connectivity.

Typical urban environments are characterized by a wide array of connectivity choices. Indeed, in places like Ecuador, UNHCR has experienced the challenge of keeping in touch with its beneficiaries via mobile phone, because refugees often will switch SIMs when MNOs offer promotions with

lower calling rates. Also, as for any humanitarian program in an urban setting, people are harder to find and engage with training and support.

As such, urban connectivity programs are usually more focused on subsidizing access to commercial facilities such as internet cafes and leveraging refugee networks to attract other refugees to computer courses that increase demand for connectivity.

⁵⁰ More information can be found in the report “Community-led Connectivity” available at: <https://www.unhcr.org/innovation/community-led-connectivity/>

⁵¹ Global Trends 2018, UNHCR. <https://www.unhcr.org/globaltrends2018/>

Part 3: Implementation and Evaluation

Lessons learned from working with Mobile Operators in the Democratic Republic of Congo and Nigeria

In order to understand in greater details the dynamics of partnership between humanitarian organisations and private sector operators we need to look at previous partnership experiences. For this research two case studies have been drawn⁵² specifically from the author's own personal experience.

The first is a recent partnership between FHI 360, MTN and humanitarian organisations including the Emergency Telecommunications Cluster and UNHCR in Nigeria. Initially designed to support reestablishment of connectivity services provided by MTN in the North-East, in a situation of great insecurity, the project pivoted towards providing connectivity in refugees hosting areas in Cross River state, connecting newly arrived refugees from Cameroon. The model employed was where FHI360 had a specific arrangement with MTN to utilise their spectrum and connect to MTN's core network, but utilising small scale base stations. This was funded in part through the Telecom Infra Project. The second case study relates to provision of connectivity services in the DRC, led by USAID in partnership with Vodacom and humanitarian actors such as MONUSCO⁵³, following security incidents. The partnership modality was similar in that Vodacom spectrum was used, with different technology being brought in by USAID and integrated into Vodacom's network.

These two case studies are covered at the end of this document in greater detail. As a preview, and to add context to the four MNO partnership models discussed here, it is worth pulling in variations of the key lessons learned from those experiences which are relevant to this discussion of business models. Here are four key insights from those two experiences:

1. Engineers are always over-subscribed

No matter how compelling the business model, how close the relationships are or how dire the humanitarian situation is, network engineers in developing countries are more often than not working at their maximum capacity. Yet, one shouldn't simply approach this fact with an arsenal of patience. It is necessary to figure out how to prioritize an agreed upon humanitarian connectivity project with them so that it does not face interminable delays. One basic strategy is to get every single person who will be involved "in the room" from the very beginning and throughout project implementation.

2. Introducing new technology can attract partners, but be prepared for a slow pace

MNOs are regularly approached by third party companies offering a diverse array of services and equipment, much of which would actually help improve their operations or increase their revenue. These many compelling offers could potentially tax their attention span and make it harder for them to concentrate on the technical requirements of new technology. Expanding a partner's network

using their existing technology options is definitely easier, but it is necessary to judge whether that technology best serves the situation-specific humanitarian needs.

3. Don't assume the world will wait for you to implement

Several months, if not years, might pass before a project actually launches. It might first have to receive regulatory approval, obtain a sign-off from the national humanitarian coordinator, identify the best location for infrastructure, import equipment, build the infrastructure, complete the core network integration, etc. Meanwhile, in an incredibly dynamic sector, other companies or organizations may have launched connectivity services that affect, even obviate, the justification for your connectivity project.

4. Be flexible in identifying value

Humanitarian connectivity projects take enough time to implement that they are appropriately thought of as journeys. This means that, by the time equipment is in place and ready to be turned on, the character or needs of the displaced population may have significantly changed from the onset. When this happens, have an open mind and value what has been accomplished. Sometimes, the partnership itself can be the goal no matter which technology is used or where it is deployed.

Assessment, Comparison, Evaluation of Performance

While it is necessary to tailor solutions to the environment, it is possible to compare and learn from other contexts. Since UNHCR works in a huge diversity of contexts, a good approach is to compare like to like, including considering the factors listed below. The aim of this guidance is twofold: On one hand it is useful to determine a baseline and to measure progress against it; on the other, once the levels have been identified, project managers in different locations can compare and contrast the needs of the population they're working with, as well as the impacts of their programs:

Factors for comparison

1. Digital literacy of refugees
2. Amount and type of Device ownership
3. Coverage (area and percentage of population, quality and speed of connection)
4. Cost of connectivity
5. Programming for meaningful connectivity

These factors should be evaluated by where they fall on a spectrum of low to high. Below are suggested characterizations of levels at opposite ends of the spectrum.

For those engaging in implementation of humanitarian connectivity projects for affected populations, these factors will drive program and partnership decisions. For example, if a digital literacy program built on a connectivity program is intended to serve a population whose native tongue doesn't have much online content, the intervention might necessarily involve content creation. It is critical to apply age, gender and diversity (AGD) considerations here, because device

⁵² See Case Study 1 and Case Study 2 later in this report

⁵³ Mission de l'Organisation des Nations unies pour la stabilisation en République démocratique du Congo

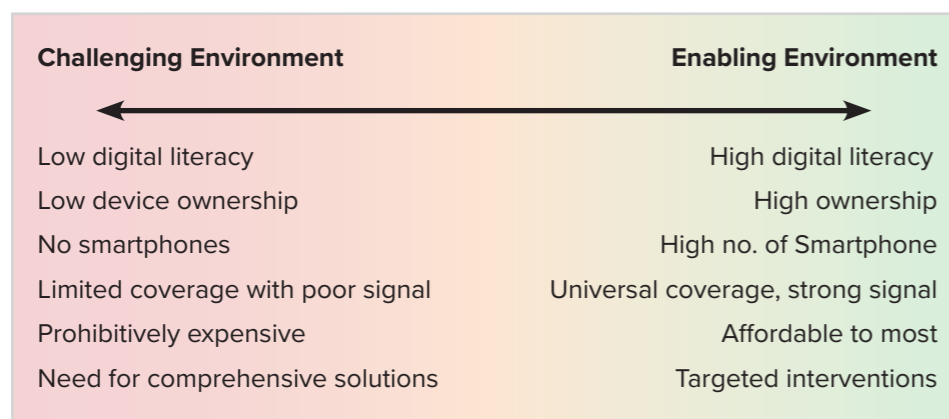


Figure 1: Factors for Comparison

ownership and digital literacy levels are likely to vary within specific groups and subsequently warrant targeted programming. All of the data collected should be disaggregated by “age, sex and other diversity considerations, as contextually appropriate and possible”⁵⁴ One useful resource for this is the GSMA’s article “Harnessing the Power of Agent to Drive Female Inclusion.”⁵⁵

Consistent interaction with affected populations is key well-informed assessment, design and comparison efforts. UNHCR’s AGD policy stipulates that, “At a minimum, country operations will employ participatory methodologies at each stage of the operations management cycle, to incorporate the capacities and priorities of women, men, girls, and boys of diverse backgrounds into protection, assistance, and solutions programmes.”⁵⁶

Recommendations

While this report has covered a number of approaches, and ways forward relating to collaboration between humanitarian organisations and private sector connectivity service providers, this section quickly highlights key recommendations for project success during implementation phase when fostering collaboration to extend connectivity services.

1. Develop clear roles (and associated responsibilities)

Often partnerships can run into issues when each party assumes the other party either is or isn’t meant to be doing something, or is unaware that the other party expects them to do something. This is easily avoidable by - to whatever extent possible, given the context - outlining clear roles and responsibilities for each party. In certain circumstances this might be governed by a procurement contract, or in cases of non-financial partnership, a Memorandum of Understanding or equivalent. By having these clear it will be possible to refer to them as the project proceeds and something to refer back to should there be a lack of clarity on any particular point that arises during implementation.

⁵⁴ UNHCR policy on Age, Gender and Diversity, p. 10. <https://www.unhcr.org/5aa13c0c7.pdf>

⁵⁵ <https://www.gsma.com/mobilefordevelopment/blog/harnessing-the-power-of-agents-to-drive-female-financial-inclusion/>

⁵⁶ Ibid.

2. Invest time in building relationships

One common mistake is to dive into partnerships without investing due time in building the relationship. Even with guiding artifacts, so many components of partnership are based on trust. This requires time. Where possible take the time to meet with your partner, in-person if the conditions allow or through remote calls and videoconferences. One technique would be to jointly undertake an activity (such as a joint presentation of the project at an event) that requires collaboration and falls outside the norm of the project. Take the time to develop an understanding of their goals and motivations, which will help you understand their positioning on the project more deeply.

3. Maintain clear and open communication

Linked with the above, clear and open communication is vital. Its important to touch base often enough but without overfacing the other party, and not to indicate ‘pressure’ in such communications. Simple updates will remind the other party of the need to progress. Often when engaging with connectivity providers they may lack some ‘humanitarian jargon’ that is commonplace in the aid sector. Try and remove this where possible and if possible, limit political dimensions that may not be relevant to the project at hand.

4. Patience

A critical and often overlooked attribute to successful partnerships is patience. The case studies demonstrated the need for patience when undertaking the project from conceptualisation to pivoting to implementation. Each party often does not have the full picture of the circumstance of the other, and how that is having an impact on progress. It can be easy to slide into frustration however that doesn’t rectify the issues. By being patient and dilligently pursuing and supporting the partner in making progress can the project eventually find the space to move forward.

5. Document

Document in writing where possible. This isn’t contra aforementioned elements around trust but complementary. While we can work off a trust basis, this is significant easier if both parties are putting progress down in writing and demonstrates their commitment to putting things on paper. If one party is shy about documenting something, have a frank and open discussion on why.

6. Contingency Planning

Project dilemmas and crisis can often ‘throw’ a partnership. And when parties develop concerns they begin to focus on self-interest. Contingency planning can help govern actions in difficult situations, and act as guiding material to focus both partners.

Further considerations

Personal security

There are limitless potential applications of technology for improved refugee well-being. There are also vulnerabilities to refugee security and well-being related to their use of connectivity. While this document focuses on facilitating the introduction of sustainable, connectivity, it notes that potential risks to their personal security presented by online activities. Humanitarian organizations helping to provide connectivity should not presume to control people's activities using communications technology. It is up to people if they want to use Facebook to locate lost family members, instead of the safer [Refunite](#) platform (if they are aware of it), which provides safety trainings and limits online searches to first names and requires users to provide specific information about their lost loved ones in order to be connected. There is a good reason for such precautions. Especially in the case of the Syria refugee crisis, "fear of government surveillance restricts the smartphone use of asylum migrants."⁵⁷ Humanitarian organizations can, however, undertake awareness raising and capacity building measures to ensure there is equitable and meaningful access, and that people are aware of threats as well as approaches to digital safety. An upcoming UNHCR publication "Connecting with Confidence" will offer much more detail on these issues.

Personal data

The partnership relationship with MNOs and ISPs gives humanitarian actors the opportunity to build in systems for collecting data on individual mobile or internet use. It is without a doubt interesting to know how new infrastructure brought in under a connectivity project is performing. Yet, this opportunity presents a slippery slope towards unnecessarily invading individuals' privacy and may not even be legal under local law. It is best to honestly consider whether data collection is necessary, whether there might be alternative approaches to learning the same information and what would happen if any form of data were to leak.

Concluding Remarks

Humanitarian connectivity project designers should seek to understand the concepts provided in this document without trying to master them. Hopefully they are inspired by the wide variety of potential business models and partners to boldly pursue forming a partnership with a local partner. Fortunately, there is help and expertise available within the UNHCR Innovation Service.

This document's focus on forming partnerships with commercial connectivity providers, potentially involving the deployment of exciting new technology, should be viewed as essentially humanitarian as any other support UNHCR provides to forcibly displaced populations. The approach is meant to support the provision of connectivity services that treat the wants, needs and aspirations of every individual equally—even if some groups had comparatively limited access prior to arrival. Successful connectivity projects are built on the experiences of each individual.

⁵⁷ "Smart Refugees: How Syrian Asylum Migrants Use Social Media Information in Migration Decision-Making". Rianne Dekker, Godfried Engbersen, Jeanine Klaver, Hanna Vonk. *Social Media and Society*, March 20, 2018. <https://journals.sagepub.com/doi/full/10.1177/2056305118764439>

Case Studies

Study 1: FHI 360-MTN-UNHCR Partnership in Nigeria

Nigeria is a country of over 200 million people which, according to the GSMA⁵⁸, has 49% mobile penetration. The country is home both to large populations of internally displaced persons (IDPs) and refugees. More than 2 million IDPs have fled their homes since 2009 when Boko Haram, began a violent campaign seeking to establish an Islamist state in the northeast region of the country. The group has killed thousands and is also well-known for its abduction of 276 girls from the town of Chibok in Adamawa state in 2014. Currently the IDPs are predominantly located in the northeastern states of Borno and Yobe.

The refugees in southeast Nigeria are Cameroonians who have fled Cameroon due to violent internal conflict between English and French-speaking areas, which broke out in 2016.⁵⁹ According to UNHCR, there are approximately 35,000-37,000 refugees from Cameroon now in southeast Nigeria, mainly in Cross River and Benue states. More than 530,000 have been displaced within Cameroon internally.⁶⁰

Along the northern stretches of the shared border with Nigeria, there are also many of the persons of concern who are actually Nigerians who had originally fled Boko Haram into Cameroon starting in 2009. Since this time, more than 100,000 of these people were forcibly repatriated by Cameroon, while tens of thousands are still in and around Minawao.⁶¹

As can be seen on this [GSMA connectivity map of Nigeria](#), both the eastern regions of Nigeria, where both IDP and Cameroonian refugee populations are located have limited connectivity. There are some exceptions, including in urban areas and in some IDP and refugee camps and settlements along Nigeria's borders with Niger, Chad and Cameroon, where aid workers reported having access to foreign GSM signals.

Nigeria Humanitarian Connectivity Project

In 2018, with the aim of deploying an innovative solution to connect displaced people in Nigeria, FHI 360 applied for and won an award under the Telecom Infra Project's OpenCellular Grant competition. Under the project, FHI 360 was awarded five OpenCellular 2G equipment sets, as well as \$50,000 to pay for deployment. FHI 360 was one of the [first grant recipients](#) [one of the first 11] of the program, the winner of the most equipment sets and the only organization which had a collaboration with an MNO.

⁵⁸ "Spotlight on Nigeria: Delivering a Digital Future" <https://www.gsma.com/publicpolicy/wp-content/uploads/2019/02/GSMA-Spotlight-on-Nigeria-Report.pdf>

⁵⁹ "Cameroon situation: Responding to The Needs of IDPs And Cameroonian Refugees In Nigeria", UNHCR 2019. <http://reporting.unhcr.org/sites/default/files/UNHCR%20Cameroon%202019%20Supplementary%20Appeal%20%28March%202019%29.pdf>

⁶⁰ UNHCR Global Focus, Cameroon. <http://reporting.unhcr.org/cameroon>

⁶¹ "Cameroon Used to Welcome Refugees. Now It Forcibly Expels Them." Philip Obajai Jr., *Foreign Policy*, February 12, 2019. <https://foreignpolicy.com/2019/02/12/cameroon-used-to-welcome-refugees-now-it-forcibly-expels-them-nigeria-refoulement/>

As an organization with an explicit focus on digital development, FHI 360's strategy in the ongoing project is to use the project to demonstrate the commercial viability of small and rural locations: Once the Nigerian Humanitarian Connectivity project is completed, FHI 360 plans to advocate that MNOs around the world leverage low-cost technology to connect the unconnected. At the core of this approach are two key ideas: 1) The solution to world's connectivity lies in the economics of smaller, cost-effective solutions, and; 2) small populations living in remote locations present a profit potential for companies.

FHI 360's MNO partner in the project is MTN/Nigeria. MTN is both Nigeria's largest MNO and the MNO with the largest country presence in Africa. Nigeria is also MTN's largest market in Africa. The partnership started with outreach on LinkedIn to then MTN Chief Technical Officer. After he accepted the invitation, FHI 360 introduced him to the OpenCellular technology and FHI 360's 30 years of continuous development and humanitarian work in the country, and proposed that the company join the NGO for its OpenCellular application.

FHI 360 agreed to use the award funds to cover capital expenditures of deployment and MTN will cover operational costs. Critically, the agreement was to use MTN Nigeria's spectrum, which it has duly licensed since 2001. Since the OpenCellular grant competition rules stipulated that beneficiaries were not allowed to earn revenue from the project, any revenue generated by the five sites would go to MTN. Ultimately FHI 360 plans to transfer ownership of the equipment and any infrastructure constructed in the project to MTN.

To entice MTN/Nigeria, FHI 360 promoted the commercial potential of equipment and the idea of being able to be an earlier adopter, advancing the position that the sooner they could integrate the equipment into their network, the sooner they could profitably connect small population centers and achieve a significant increase in revenue. An informal working rule of thumb for OpenCellular equipment was that, if at least 20% of the people in a village of 500 people spent \$2 per month, the site would become viable, although this also requires contextual adaptation. While MTN deployed network hardware from a variety of vendors, the small size of locations where the 100 million people lacking mobile access lived, an additional solution was of interest to the company. During the initial conversations, MTN also discussed a need to re-establish the approximately 130 cell towers that Boko Haram had destroyed over several years, as well as the fiber backbone to Maiduguri, which Boko Haram had apparently torn up. (The online GSMA coverage map reference earlier shows how limited the connectivity in the northeast corner of the country.)

Since winning the OpenCellular award, FHI 360 and MTN/Nigeria's collaboration has benefitted from a high level of communication and collaboration. MTN even sent a representative to the [2018 OpenCellular Workshop in Nairobi](#), where FHI 360 had been invited to present the project.

Equipment limitations

Throughout the project implementation, FHI 360 has considered how best to deploy the five OpenCellular kits, given their individual limitation to only 14 simultaneous calls. Even though it would be challenging to accurately guess the initial uptake of a cellular connection in a newly connected community, the equipment's limited capacity presents unique questions for implementation. The

organization wants to make sure every individual's first experience is a good one, and that the equipment can handle a normal level of network usage.

Deployment location considerations

FHI 360 initially planned to deploy the towers in the northeastern part of the country, but eventually decided to do so in the southeast. During the initial period when it was planning to deploy the towers in the northeast, FHI 360 engaged the UN's Emergency Telecommunications Cluster (ETC) with the aim of being an open and collaborative humanitarian partner. The ETC had developed a helpful map of the different types of communications infrastructure in the areas affected by Boko Haram. It was also ready to help FHI 360 refine its site selection by using its extensive knowledge of the current security situation.

While under normal circumstances, where the security of an area would allow one to choose any appropriately sized town, the security situation in northeast Nigeria, with its isolated islands of security, meant that FHI 360 has only been able to consider locations with populations that were too large for the OpenCellular equipment's capacity. The Nigeria team contemplated several innovative approaches for effective deployment in locations with populations in the thousands. For example, they considered a paradigm where the base station would be configured to only accept calls coming or going to a limited number of SIMs. The team considered whether phones with these specific SIMs could be held at a call center, where people would queue, and a manual system would be established to record information from incoming calls. The team also considered a paradigm to limit the load on the base station by configuring it to allow only certain SIMs to work at pre-defined times of the day. None of these approaches, however, gained much traction, because they did not conform with FHI's desire to enable a market-based approach to connectivity.

While deploying in the northeast was under consideration, the security of residents, as well as any potential infrastructure, was constantly on the minds of the partners. The Nigerian military reportedly had at times expressed concern that towers would be used by Boko Haram to coordinate attacks. Both FHI 360 and the Nigerian authorities seriously considered whether the tower placement would invite attacks from Boko Haram, gravely endangering the IDPs both were trying to protect and assist. The military had deployed troops around several towns in the northeast, but hadn't established complete security in the spaces in between. The result was a plan in which there would have been small and secure locations with connectivity, that would be surrounded of large insecure areas without it.

Switch of focus to Southeast; Collaboration with UNHCR

Eventually, due the persistent security challenges in the northeast, FHI 360 decided to change its deployment focus to southeast Nigeria, where it had multiple projects providing varied assistance to refugees from Cameroon. This switch in focus led to a collaboration with UNHCR, which was interested in assisting refugees with connectivity in general and in leveraging the connectivity for enhanced livelihoods programming. Working with UNHCR offered other benefits, like local presence, engineering expertise and a partner also engaged in humanitarian work.

The very positive collaboration has seen UNHCR help by providing cost estimate for constructing a basic cell tower utilizing local construction materials and services and by offering existing UNHCR structures. Together, FHI 360 and UNHCR have begun planning to deploy the OpenCellular equipment in one of the refugee settlements south of Ogoja town in Cross River state. Site location discussions would proceed by FHI 360 identifying a potential location, then sharing its precise latitude and longitude with MTN, which has its towers in a system that automatically determine that its particular location was, for example 14 km 189 degrees away. These interactions were a way to ensure a site was of potential long-term interest to MTN. They also served to bridge commercial and humanitarian spheres. In one instance, MTN received coordinates for Ikyogan from FHI 360 and pushed back, because the location was too far from any population center. While the location was indeed remote and unpopulated, the company was unaware that UNHCR had decided to relocate at least 5,000 refugees there from the town of Anyake, where they were originally placed.

While the significantly better security situation in the southeast increased the choice of deployment locations, the limited capacity of each individual OpenCellular kit has led FHI 360, together with Facebook's OpenCellular team, to pursue a deployment model where all five kits will be deployed together, where some would be used for voice, SMS and USSD, while others would be used for mobile data at EDGE⁶² speed.

Other Challenges

During the time of project implementation, there have been other issues affecting the different actors involved in the project and understanding them helps contextualize the humanitarian partnership. For example, in 2018, during the period of collaboration, MTN faced a suit from the Nigerian Central Bank for illegally repatriating profits in Nigeria to South Africa. The original fine for this infraction was \$8.1 billion, but was negotiated down to \$53 million. It wasn't the first time the government had attempted to fine MTN: In 2015, the Nigerian Communications Commission fined MTN/Nigeria \$5.2 billion for failing to disconnect unregistered 5.2 million SIM cards (an amount based on a fine of \$1000/per SIM). The fine was eventually negotiated down to \$1 billion, and was meant to be paid off in 2019—a precondition for the company proceeding with its desire to be listed on the Nigeria Stock Exchange (NSE). And in October 2019, the Nigerian attorney general demanded the company pay \$2 billion in back taxes related “to the import of equipment and payments to foreign suppliers from 2007 to 2017”.⁶³ Contrastly, MTN launched its Momo service in August of 2019, after the central bank finally cleared the way for MNOs to launch mobile financial services. These services were always intended to be leveraged within the FHI 360-MTN partnership if they ever to receive approval, so this was welcomed news on both commercial and humanitarian grounds: According to Quartz Africa, only 40% of Nigerians have bank accounts and they can be very useful to refugees. The Nigerian market is expected to grow larger than Kenya, where Africa's original mobile financial service mPesa was originally launched in 2005.

62 Enhanced Data for Global Evolution

63 “UPDATE 1-MTN's \$2 bln Nigerian tax dispute case set for Jan. 30-31” <https://www.cnbc.com/2019/10/29/reuters-america-update-1-mtns-2-bl-nigerian-tax-dispute-case-set-for-jan-30-31.html>

Not the only game in town

During the time of the project, the rural connectivity picture evolved. Several months after the FHI 360 and MTN agreed to work together to deploy OpenCellular equipment, Africa Mobile Networks (AMN) formed a partnership with MTN to install small base stations throughout rural Nigeria using OpenCellular and other technology. AMN has not disclosed the amount of towers it plans to build in Nigeria, nor the terms of its revenue sharing agreement with MTN. Yet, reportedly they will be deploying 3000 base stations. While FHI 360 was the first to propose use OpenCellular equipment to MTN, AMN will deploy it (along with other equipment) first, and at much larger numbers.

Remaining Challenges

One remaining challenge for the project will be obtaining SIM cards for refugees who arrived without formal identification. Foreign citizens can obtain SIM cards in Nigeria, but identification and registration are required. Identification requirements for SIM access will remain a challenge for many refugees for the near future.⁶⁴

The Telecom Infra Project (TIP)

The Nigeria Humanitarian Connectivity project is happening under the Telecom Infra Project (TIP), an intra-industry effort to coordinate a variety of efforts to improve technology within the connectivity ecosystem. The technological developments under TIP have potentially important implications for humanitarian actors looking to set up connectivity partnerships with MNOs or ISPs, because, as the cases of Nigeria and DRC show, such partnerships can provide strong opportunities both to field test new technologies and to demonstrate what role they might play in connecting the unconnected.

Facebook is the main sponsor of TIP, though many industry heavyweights are also playing active roles. Generally, Facebook and other TIP members are collaborating to open-source connectivity software and hardware, with the ultimately goal of bringing down infrastructure costs and “democratizing” connectivity. They are leveraging open-source to allow new players to compete and, as a result, enable the expansion of connectivity to the entire world. They are focused on disaggregating and open-sourcing components of the communications technology value chain, from the equipment on cell towers, to the signal, to retail software for Wi-Fi and more. In addition to the OpenCellular technology FHI 360 won, TIP has projects focused on millimeter wave, OpenRAN, network slicing, vRAN, optical and packet transport and edge computing. And the TIP team working on OpenCellular equipment has continued to develop it, increasing its flexibility. Also, TIP was set to announce the second round of OpenCellular winners in late 2019 or early 2020.

64 <http://www.unhcr.org/innovation/displaced-and-disconnected/>

Study 2: DRC, USAID and Vodacom Partnership

The project in Nigeria is similar to a project USAID implemented in the Democratic Republic of the Congo a decade ago. This project emerged as a response to a massacre of civilians perpetrated by the Lord's Resistance Army (LRA), where in 2009 they killed at least 321 civilians and abducted at least 250 more. It took several weeks for the outside world to fully learn of the attack due to the lack of reliable communications infrastructure. The massacre, chronicled in a report by Human Rights Watch⁶⁵, led USAID to seek potential applications of communications technology that could increase protection of the population from future attacks.

After traveling to the region and considering many different technology choices, the project design team, identified low-cost GSM equipment and partnered with Vodacom/DRC to deploy it. In an approach that was very similar to the Nigerian Humanitarian Connectivity Project, USAID and Vodacom agreed to use Vodacom's spectrum, which licensed in 2001. Like FHI 360, USAID brought specific equipment to the partnership that its MNO partner was not currently using. In this case the equipment was made by Altobridge, a now defunct Irish company that manufactured in China. USAID's budget only allowed for the purchase of four base station sets, plus the Altobridge switch which was placed in Vodacom/DRC's Kinshasa headquarters. Vodacom, for its part, reportedly distributed free 2G cell phones in the four locations it established with USAID's support.

One of the key functionalities of Altobridge's technology was its capacity for local switching, the ability for a base station to route a call itself, without having to first send the signal back to the MNO's main control center. Given the need to use expensive satellite backhaul for these remote locations, local switching presented an opportunity to cut operational costs. Altobridge believed the vast majority of calls would be local calls, i.e. calls made to someone else within range of the same base station. During their partnership negotiations, USAID and Vodacom/DRC discussed the sharing of anonymized call detail records (CDRs) for the four towers USAID sponsored. While it is not clear whether the CDRs were ever shared, the aim was to compare the overall uptake for the four locations, and analyze the origin and destination of calls.

While in Nigeria, FHI 360 has collaborated with the ETC and UNHCR, in the DRC USAID spoke frequently with MONUSCO (Mission de l'Organisation des Nations unies pour la stabilisation en République démocratique du Congo, or, in English, the United Nations Organization Stabilization Mission in the Democratic Republic of the Congo), the UN organization in charge of supporting peacekeeping in the DRC. MONUSCO offered logistical support to the project, including transporting the equipment to site. The USAID-Vodacom relationship ultimately achieved great success, because Vodacom, after seeing how well the comparatively small Altobridge base station technology worked, Vodacom purchased an additional 150 low-cost base stations and placed them around the country. (These base stations were apparently made by Huawei, however.) Altogether these base stations reportedly earn Vodacom millions in additional revenue, primarily due to the network effect: The traffic enabled by the four towers installed under the project primarily came

65 "Trail of Death: LRA Atrocities in Northeastern Congo", 2010. <https://www.hrw.org/report/2010/03/28/trail-death/lra-atrocities-northeastern-congo>

from people calling to the four locations, rather than from them. After installing USAID published a success story on the project in 2014.⁶⁶

Lessons learned from both collaborations

1. Equipment Mattered

In both cases, the development actor brought new technology to the table. The partnerships gave the MNOs the opportunity to engage in isolated experiments with new technologies, outside of their large contracts for network hardware, software and maintenance. Yet, it wasn't about the equipment itself: In both cases the new equipment promised to make smaller locations profitable. The two projects show how much the equipment has come down in price. While their capacity was not identical, one Altobridge base station cost roughly \$40,000 in 2010. At a recent trade show one OpenCellular representative said one OpenCellular base station with the tower costs less than \$11,000.

2. Collaboration begets collaboration

Even before completion, ongoing collaboration discussions provide a great platform for expanding or diversifying the partnership. Since there are many different deployment models, partnership discussions often bifurcate when multiple approaches appear feasible. The partners were simply unaware of the extent to which their interest overlap. As they get to know each other, it becomes obvious it is possible to collaborate in multiple ways. In Nigeria, for example, ongoing discussions with UNHCR led to a separate, focused discussion on a Wi-Fi solution for a different refugee location.

3. If no one builds bridges, the potential won't be realized

It is undeniable that MNOs will earn more revenue if they deploy the right combination of hardware and business models to locations where they currently do not provide service. The arguments for providing connectivity in areas where it is lacking goes beyond the benefit of being good corporate citizen; these locations present potential profits. The pieces simply need to be brought together by stakeholders.

4. The UN is Present at the Last Mile

In both the Nigeria and DRC collaborations, the United Nations played an important role. In Nigeria, the collaboration with UNHCR is more pronounced. Yet, in both cases, the UN's presence on the ground in remote areas meant that it was able to provide USAID and FHI 360 with critical information on security, as well as on other relevant humanitarian activities. Additionally, having the UN involved added a measure of legitimacy to the projects. These experiences demonstrated there is no other organization that is more likely to be present on the ground in humanitarian situations where connectivity could benefit the affected population.

66 "Cell Towers Increase Security in DRC." USAID Archive. <https://2012-2017.usaid.gov/results-data/success-stories/strengthening-community-protection-through-mobile-phone-coverage>



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