



# GSMA PathFinder

Solving provider look-ups to enable mobile money interoperability





## PathFinder

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with almost 300 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series of conferences.

For more information, please visit the GSMA corporate website at [www.gsma.com](http://www.gsma.com)

Follow the GSMA on Twitter: [@GSMA](https://twitter.com/GSMA)

### GSMA Mobile Money

The GSMA's Mobile Money programme works to accelerate the development of the mobile money ecosystem for the underserved.

For more information, please contact us:

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GSMA PathFinder, powered by Neustar, is a real-time telephone number information service that identifies the world's in-use fixed and mobile portable numbers, by operator, providing one access point for business critical information to aggregators, hubs, SMS gateways and social media networks.

For more information, please contact us:

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Powered by:

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# Introduction

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Mobile money services are now widespread – as of the end of 2017, there were 276 deployments in 90 markets globally. As mobile money services mature, there is growing demand for interoperability both with other mobile money services, and the wider financial ecosystem.

Interoperability with the banking sector and other traditional payments networks can provide an additional source of money flowing into the mobile money ecosystem and increase the utility of mobile money for its users. Cross-border interoperability to facilitate international money transfers is also increasing, with 46 remittance corridors now up and running.

The convenience of being able to send funds to a contact, simply by inputting their mobile phone number, will fuel increased growth in adoption and usage.

In order to transact efficiently between the growing number of mobile money services, banks, microfinance institutions and other payments providers, there is a need to look-up where a payment should be directed.

Hence, there is a need for switches (and other interoperability mechanisms) to resolve the route for each transfer and payment between providers: they need some way to determine which mobile money service provider the recipient is using so the funds can be transferred to their account. In the international banking system, an International Bank Account Number (IBAN) serves this purpose, identifying both the individual account and the bank that runs that account. In the mobile money sector, funds are typically sent using a mobile phone number (MSISDN) alone.

Sending money to a recipient's phone number is both natural and obvious. But there are complicating factors when considering the prospect of utilising an MSISDN as a payment identifier. One complication is that more than 200 countries have introduced telephone number portability. In countries that have adopted number portability, individuals can retain their (mobile or fixed) telephone number as they switch between different operators, meaning that the list of phone numbers associated with a mobile operator is dynamic, i.e. an MSISDN may not be associated with the operator it was originally assigned to. Globally, more than 4.6 billion telephone numbers are now portable.

In many markets with interoperable mobile money services, the sender is required to input the mobile money service provider of the recipient, raising a number of practical issues that erode the convenience of mobile money propositions. This approach relies on the sender knowing which service provider the recipient uses. Even if they do know the service provider, a user of a feature phone may then have to scroll through multiple menus to find the right one. Moreover, this manual approach means bulk payments to multiple recipients using multiple service providers could become excessively cumbersome. These issues are likely to become increasingly problematic as more mobile money services are launched and public and private organisations come to rely on them to distribute funds to individuals.

# GSMA PathFinder's role in a more integrated mobile money industry

As the mobile money ecosystem expands to open more international corridors and embraces a broader set of service providers, requiring a user to input the target service providers will become impractical. One way to streamline the process is to employ the solutions used to direct telephone calls and messages in those markets that have implemented number portability. Typically, these solutions involve looking up the host operator of a phone number in a registry like GSMA PathFinder. Already nearly every mobile operator in the world receives traffic routed using the GSMA PathFinder service powered by Neustar [see Textbox 1]. As a number portability lookup service, PathFinder ensures that when an individual makes a phone call or sends a message, it is relayed to the correct telecoms network currently responsible for the target MSISDN.

GSMA PathFinder can potentially offer the same benefits for the mobile financial services sector. For example, when a mobile money user submits a request to send money to another mobile money user on another network, PathFinder can be queried to retrieve the appropriate receiving mobile money provider to route the transaction. The PathFinder query can potentially be initiated at the local provider, or at a central switch. However, implementing the lookup service at a switch reduces the need for multiple integrations by individual operators.

In the summer of 2017, the Bill & Melinda Gates Foundation and its partners ran tests of the GSMA PathFinder service to determine the feasibility of addressing peer-to-peer payments using the intended recipient's mobile phone number, and without specifying the carrier or digital financial service provider (DFSP) of the recipient. The tests involved four key steps:

- A mobile money user sends payment instructions to their DFSP.
- The DFSP determines that the recipient doesn't use their service and forwards the transaction to a switch.
- The switch queries PathFinder, which then returns the recipient's service provider.
- The switch then forwards the transaction to the correct DFSP.

The tests demonstrated that GSMA PathFinder provides a solution for switches and payment schemes looking to make it easy for individuals to send funds to people on different financial services providers. "The top line is that the GSMA PathFinder tests validated our thinking, that a central directory lookup through PathFinder simplifies

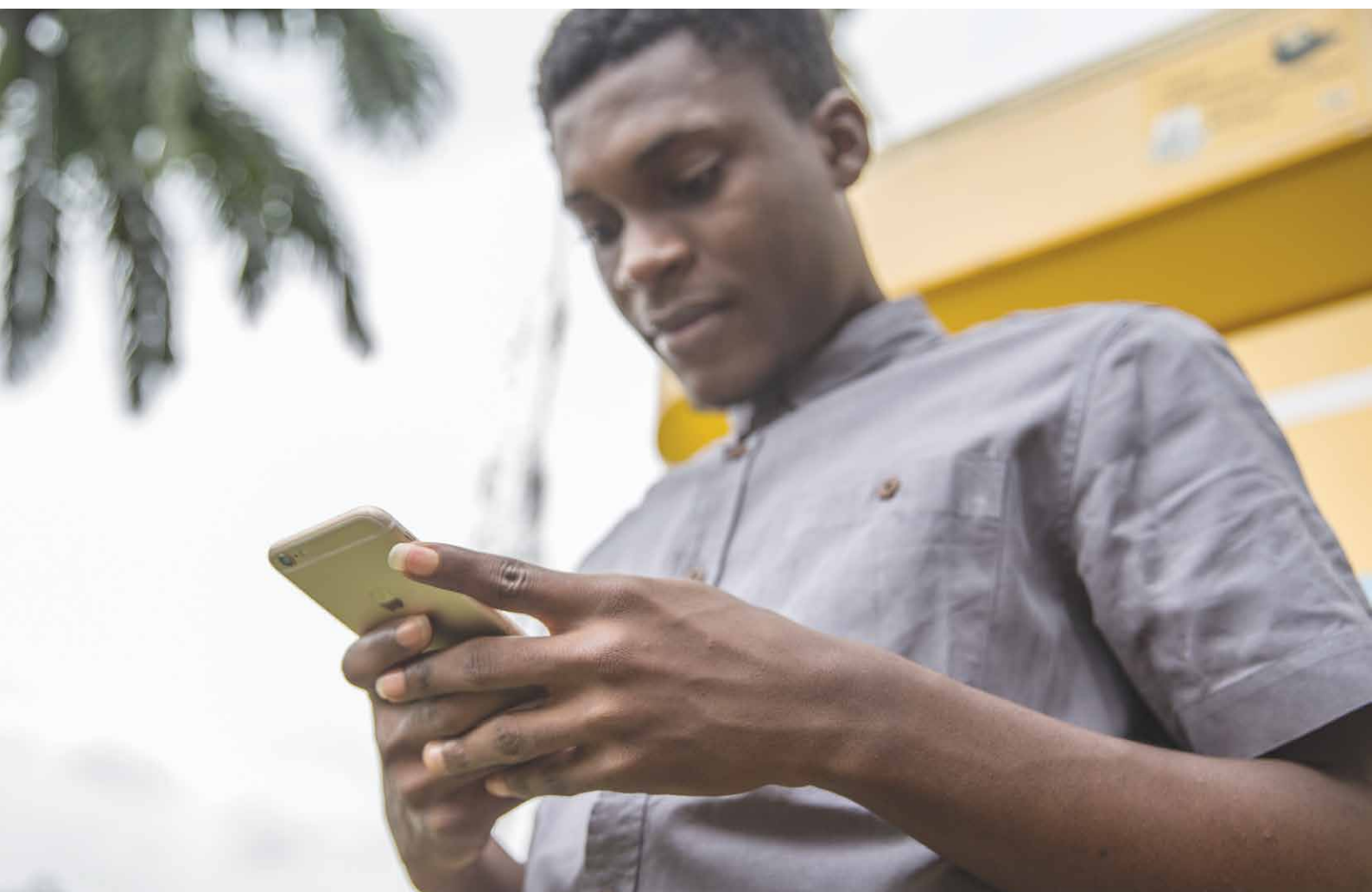
payments addressing and can alleviate concerns about proprietary user data sharing, and it works both domestically and cross-border,” says Miller Abel, Principal Technologist at Bill & Melinda Gates Foundation. “We would recommend integrating GSMA PathFinder into an interoperable payments scheme to support simplified payments addressing.”

Following the successful tests, the Gates Foundation and its partners have integrated the GSMA PathFinder platform with their new open source software solution designed to help create interoperable payment platforms and expand access to safe, affordable digital financial services for the poor. The software, called Mojaloop (see Box 2), provides code that banks and financial service providers can use to build platforms for connecting customers, merchants, banks, and other financial providers in a country’s economy into a single seamless, secure, and affordable system.

GSMA’S partner, Neustar, is working with the Mojaloop programme team to explore the administrative means necessary to enable end users in a Mojaloop-enabled scheme to register their financial service provider and associate a DFSP identifier with the

specific mobile phone number. This would mean that GSMA PathFinder could return not only the telecom operator serving an end user, but also that user’s preferred financial services provider. The team is exploring additional administrative use cases such as maintaining end-user preferences, removing end users who close accounts, and assigning defaults for new unregistered mobile payment recipients.

The tests were helpful in highlighting the value of connecting mobile money switches directly to the GSMA PathFinder platform, and that queries and updates to PathFinder for mobile money preferences are channelled through switch APIs rather than directly via telecom provider interfaces to PathFinder. An example benefit of this relates to the nature of PathFinder update propagation times, as changes to PathFinder domain records can take up to six hours to propagate through the operators connected to the PathFinder directory. A central switch can cache updates and respond directly to queries while PathFinder updates propagate through the system. This provides an immediate and correct answer to local queries while maintaining the long-term benefits of a global addressing solution.



## TEXTBOX 1

## About the GSMA PathFinder Service

PathFinder is a GSMA branded solution operated by Neustar as a centrally hosted, managed service in production since 2009. PathFinder is a number resolution service used by communication service providers including mobile operators, messaging aggregators, content providers, messaging hubs, financial service providers, and social media networks.

GSMA PathFinder is operated by a team of industry experts that continuously updates global telephone number data, including the number plans for 240 countries and territories. Service provider users are able to instantly identify the correct destination network for relevant traffic termination using the service. PathFinder acquires portability data using widely disparate protocols and assimilates the bespoke data formats from many different 'ported' country data sources into a centralised PathFinder database accessible via a single API. To ensure the highest quality of information PathFinder uses only authoritative data sources and in addition uses a network of over 100 points of contact to confirm updates.

GSMA PathFinder's interconnect feature enables customised data to be provisioned against telephone numbers adding rich dynamic information to the routing profile. Multiple fields can be added to the PathFinder database to support customised responses of customer specific data. A DFSP, for example, could attach mobile money scheme identifiers to a telephone number so that service providers don't have to expose sensitive information to third parties. PathFinder's network routing functions automatically check that a destination number conforms to a valid format and belongs to an allocated number range. This helps users identify certain types of fraud, and ensure that calls or messages addressed to invalid destination numbers do not take up valuable interconnect resources.

Accessible through a single interface, GSMA PathFinder is a carrier grade solution that can be used for any service requiring telephone number information. For example, it supports Mobile Connect, a universal identity solution developed by the GSMA and its operator partners, for two-factor authentication. Mobile applications that need to communicate with the user's service provider use GSMA PathFinder to identify the correct operator, allowing messages, API calls and mobile money payments to be routed correctly.

Find out more at [gsma.com/pathfinder](https://gsma.com/pathfinder)

## TEXTBOX 2

## About Mojaloop

Mojaloop is an open source software toolkit that can be used to set up a mobile money switch, enabling both domestic and international interoperability. The Mojaloop software was developed by a partnership of leading fintech developers—Ripple, Dwolla, ModusBox, Software Group and Crosslake Technologies—with funding and support from the Gates Foundation. The software has three main components:

An interoperability layer, which connects bank accounts, mobile money accounts, and merchants in an open loop environment.

A directory service layer, which navigates the different methods that providers use to identify accounts on each side of a transaction.

A transaction settlement layer, which makes payments instant and irrevocable. It also has components that protect against fraud.

The code for each layer is accessible individually on GitHub. Developers can explore and use parts of the software, or they can work with the whole thing.

The Gates Foundation believes that the lower two rungs on the mobile money ladder – the rules (regulation) and rails (infrastructure) should be simple and consistent, open to all providers, and operated as a utility, while the higher two rungs – the accounts and apps – can be a source of differentiation and an arena for commercial innovation and competition.

### WHAT YOU CAN DO

Join us as we work to make digital financial services interoperable and inclusive around the world. Explore the code on GitHub, use it to enhance your products and services or build new platforms to provide industry-wide benefits. We value your feedback and contributions to the software.

Find out more at [Mojaloop.io](https://Mojaloop.io)



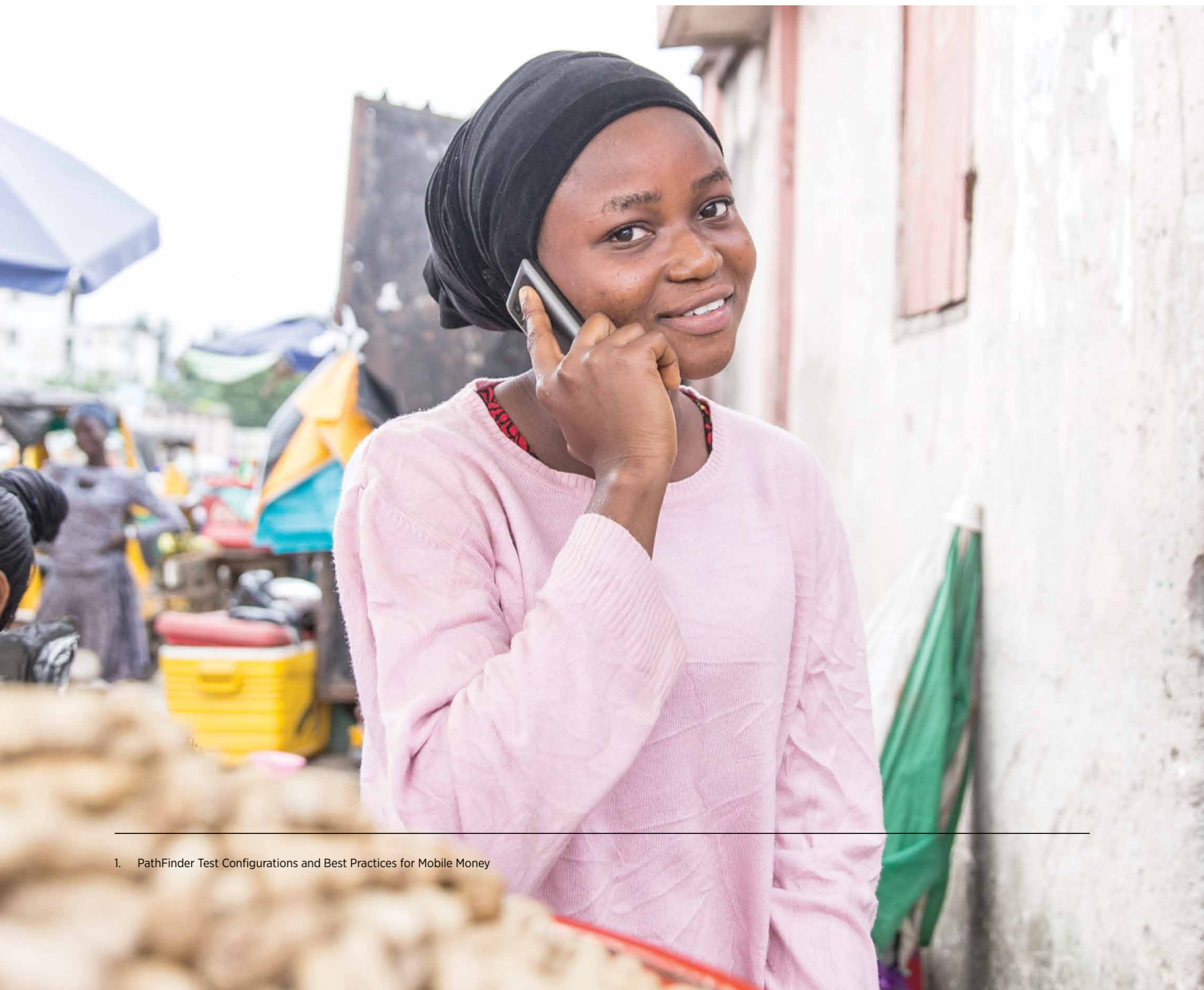
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# Conclusion

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As interoperability becomes the norm and the mobile money ecosystem expands, the ability for a transaction to be routed to the target operator in an efficient manner without requiring the user to enter operator information, will become necessary. While various models have been developed to handle mobile payments addressing within an interoperable environment, GSMA PathFinder may offer a solution, which requires limited development and maintenance for payment schemes and participants, while

providing global lookup for nearly all international mobile numbers and their associated operators. Since the completion of testing, the Gates Foundation has sponsored a set of recommended practices intended as a guide for implementing PathFinder as a lookup service for mobile money infrastructure providers – *PathFinder Test Configurations and Best Practices for Mobile Money*<sup>1</sup> can be found on the GSMA Mobile Money website as an accompaniment to this paper.



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1. PathFinder Test Configurations and Best Practices for Mobile Money



For more information please visit the GSMA website at [www.gsma.com](http://www.gsma.com)



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