# M-Arca: Smart Community Banking

**Contact:**

*Lawrence McDaniel*
*lpm0073@gmail.com*
*+52 1 (55) 4388-3070*
*+1 (415) 766-9012*

**Abstract**

*M-Arca is a Mexico-based alternative consumer financial services pre-startup that will provide international wire transfer and peer-to-peer lending services to rural communities in Mexico. We are the world's first provider to extend compelling financial services, "the last mile", to 40 million customers' doorsteps in rural Mexico.*

*M-Arca will offer international wire transfers originating from USA of up to $500 dollars, delivered to select locations in Mexico ("Arcas") for a fixed fee of $2 dollars, and, we will provide access to recipient funds in less than 5 minutes on average. We will also offer free peer-to-peer lending services to participating communities, with the potential to receive matching loan funds from outside the local community. M-Arca's services are deployed as a single Android mobile app that works in tandem with a small $750 Mexican peso ($45 USD) on-premise device called an Arca.*

## Overview

Remittences originating from USA destined for Mexico total more than $25 billion dollars annually in a highly consolidated market, famous for being as expensive as it is inconvenient for customers. Average remittence transactions cost more than 15% of amounts being sent for most customers, but routinely cost more than 30% for small balance transfers of less than $100 dollars. Remittences are typically delivered through large national chain operators whose branches are not conveniently located for a large cohort of recipient customers, and the often not-insignificant travel costs to/from a money transfer branch location are an additional hidden cost to the consumer. To date, we've not seen any project nor institution successfully deliver a compelling financial service to a rural Mexican customer's doorstep — the "Last Mile" if you will. Substantial opportunities exist to disrupt this market on the bases of cost, speed, and customer convenience.

Meanwhile, we reckon that the potential market for small balance peer-to-peer loans in Mexico could nearly match the international remittence market in size, though in fact this market does not yet exist. Micro lending, a billion dollar market in Mexico and the closest proxy, is a high-cost and labor-intensive alternative. Micro lending operations in Mexico are modelled on a nobel prize winning, though antiquated lending model first introduced to a mostly illiterate populace in Bangladesh in 1981 in which state of the art technology at the time was literally pencil and paper. An opportunity exists to develop a peer-to-peer lending market using many of the proven best practices of Grameen Bank's original 2.0 model, albeit updated to reflect the high literacy rate in Mexico and equally high penetration rates of internet-connectable devices in rural Mexico.

A large percentage of both markets are mutually inclusive, residing in rural parts of Mexico, beyond the coverage areas of both 3G cellular and broadband internet service. Delivering compelling financial services like fast, low-cost international money transfers and low-interest peer-to-peer loans to the rural unbanked in Mexico requires a deep reassessment of the global financial system and its legacy infrastructure, its business strategies, conventional wisdom surrounding financial product design, and rapidly evolving technology trends. M-Arca was formed to do exactly that.

M-Arca will provide fast, reliable and inexpensive international wire transfers and low-balance, low-interest peer-to-peer unsecured consumer loans to Mexico's rural unbanked. We approach each product with a design philosophy underpinned by a deep localised understanding of how rural Mexican communities operate and we combine this with a brutally pragmatic approach to current state of the art technology, which is to say that the legacy infrastructure of the global financial system does not hold much sway with us. Our financial products are intuitive, accessible, convenient, competitively priced and uniquely suited to the rural market.

## Business Plan Summary

M-Arca's business operations contemplate three revenue models. First, we generate most of our revenue thru USD-MXN market marking activities related to fulfilling international wire transfers. Additionally, we charge syndication fees to external investors participating in our community peer-to-peer consumer loan program. Lastly, M-Arca will *possibly* wholesale Arcas at a price that makes the device a profit centre.

M-Arca's financial services are architected around life in rural pueblos and Internet-disconnected villages in remote areas where commerce is concentrated around a single monolithic general store (the Abarrotero), and long-distance communication is relayed person-to-person in daisy chain like fashion until messages reach their intended recipient. M-Arca codifies both, digitizes identities of the individuals within the community, and codifies and quantifies the trust relationships that exist among the individuals in the community. Ironically, M-Arca upends conventional wisdom about how to best deliver financial services to the rural poor by largely changing nothing at all about the way these people have done business with each other for millennia.

At the heart of all M-Arca services is a black box router, proximity sensor and block chain node (the "Arca") that is available for purchase for $750 Mexican pesos ($45 dollars) at participating retailers,

and is intended to be installed in a rural general store or equivalent retail setting. Yes, it literally is a black box. Once properly installed, which takes around 15 minutes, a merchant who has also gained the trust of at least 10 customers can begin offering remittence delivery services and cash disbursements of small balance loans, earning fixed fees of $30 pesos per transaction. so, the merchant fully recovers his Arca investment after 25 transactions.

The Arca uses distributed ledgers known as block chains to record financial activity and key administrative support activities, and crucially, makes it possible for the community to record peer-to-peer transactions in its block chain even when no Internet service is available. A customer receiving a cash disbursement of a US-originated remittence digitally records her visit simply by entering the store location with her Android device powered on. She records her receipt of funds in a similar way, from an acknowledgement screen on her Android device that only works while in proximity to the Arca. A group of loan guarantors approve a new consumer loan by digitally signing the ledger; an action on their Android devices that also is only made possible when they are in proximity to the Arca.

Most of what the Arca does is hardly extraordinary. It's innards consist of a tiny linux computer, smaller than your thumb and costing less than $12 dollars; a product of the evolution of the Internet of Things (IoT). The Arca acts as an information hub for computer messaging to/from a block chain representing financial transactions operating over a to-be-determined protocol, and another proprietary block chain, entirely unique to Arca, representing a message registry of user activities surrounding the financial services that M-Arca provides. What is extraordinary about the Arca however is that it is an Internet hub that does not require a persistent Internet connection in order to function properly. More extraordinary still, the Arca can operate in a remote village without running electricity. Ironically once again, figuring out how to do this all required going backward in time to the 1960's, when NASA had to design an effective communication scheme to control unmanned space equipment by bouncing messages satellite to satellite in a peer-to-peer messaging strategy using nothing other than solar power.

In M-Arca's case, rather than satellite equipment on a defined trajectory we instead have individual community members meandering along some random path with an Android phone in tow, connecting to our peer-to-peer network voluntarily and in ad hoc fashion. So there are unique challenges which must be overcome. Critical to helping our network achieve its potential in speed and reliability is a loyalty points incentive program for community users. They download our Android app and opt-in to participate in a peer-to-peer wireless messaging delivery network whereby their phone chirps any time that they enter proximity of another network member and the two Android devices decide to bounce messages from one device to another. Users are made aware of intended destinations (though the contents of messages remain confidential), and they are rewarded with loyalty points if they are part of the chain of participants who ultimately deliver a message to its intended destination. Loyalty programs are locally administered by the merchant Arca owners. Additionally, the overall quality grade awarded each community network is one of several factors used to qualify a community for external funding. M-Arca's network becomes self-optimizing surprisingly quickly, and in short order can intelligently route messages using this archaic networking strategy with a minimum of network hops and with equally surprising speed.

**International Wire Transfer Service**

Remittences are M-Arca's bedrock service. M-Arca acts as its own USD->MXN market maker for all of it's remittences and generates 100% of revenues for its international transfer services from market making activities.

Strategically, we intend each community purchase of an Arca to be immediately and absolutely disruptive to the local market, resulting in a near-monopoly in each micro market. Our product is cheaper, more reliable and more useful than any market alternative. M-Arca can work harmoniously with many international transfer services, enabling us to copt US customer acquisition of many large estimating franchises. We charge no bridging fees, though we do require that we be the market maker.

M-Arca wire transfer service is more compelling to customers on multiples levels. First, the fixed cost of $2 dollars is multitudes cheaper than the next closest competitor, and makes possible for the first time, money transfers of significantly less than a hundred dollars. Perhaps even more important however, M-Arca's franchise models puts points of presence within walking distance of most customers. Lastly, wires can be initiated from USA using prepaid Visa debit cards which can be purchased at thousands of retail locations around the country. We believe that most US remittences are initiated by male household members who crucially are heavily influenced by female recipients within the same rural Mexican household. **Our view is that we win the business of the man in USA by earning the trust of the woman in Mexico.**

We should point out that Pesos received to Bluetooth-enabled Android phone hot wallets in Mexico can be exchanged toll-free with other community users. Importantly, we believe that our business model incentivises Mexican recipients to conduct business on a person-to-person basis using Peso balances stored in their Android hot wallets because in fact, M-Arca only charges for the disbursement of funds in cash rather than the transfer of funds themselves. Therefore, an international transfer of say $10 dollars, arriving to the recipient as $170 Pesos and immediately transferred electronically to, lets say, a local carpenter in the community for a household repair, would in fact incur no fee whatsoever. This in our opinion, encourages smaller, more frequent use of the international transfer service as well as extensive use of local Peso balance exchanges as a means of commerce; both of which further entrench M-Arca's market presence in each micro market where it exists.

**Peer-to-Peer Lending Platform**

multi-guarantor, unsecured consumer loans are an ancillary albeit core service of M-Arca. M-Arca generates revenue by charging participation fees to outside investors who participate in syndicated loans to borrowers residing within qualified communities. Merchant Arca owners earn a $30 peso flat fee on cash loan disbursements to borrowers. Merchants are also required to host recurring loan program guarantor meetings.

M-Arca users can earn borrowing privileges by participating as a guarantor and as a lender in the community peer-to-peer cash loan program. Peso balances stored in users' Android hot wallets can be allocated ad hoc to the pool of funding made available to potential borrowers in the local community. Interest rates are negotiated by and between the lenders, guarantors and the borrower, and lenders receive 100% of principal and interest loan instalment payments. Loan products are simple interest, fully amortized, no-frills products with $5,000 M.N. maximum loan limits, and no origination nor commit nor late payment fees. The loan program largely follows time-tested best practices gleaned from Grameen 2.0 micro lenders, though all activities are voluntarily and automatically monitored via the users' Android apps and the Arca.

M-Arca's peer-to-peer lending program is powered entirely by the Android and Arca computing equipment owned by the community and is therefore theoretically infinitely scalable. The lending program is self-administered entirely by the local community users, for the direct economic benefit of the local community users. Users earn trust within the M-Arca platform by performing activities and obligations according to the policies established by the platform. This includes participation in community lending meetings and making instalment payments as and when agreed.

Communities who consistently operate a successful lending program synergistically gain collective trust greater than that of the sum of the individuals. These community success stories become eligible to receive matching funds from outside the community. Participation in the program is not free to external investors however, as M-Arca charges a nominal participation/syndication fee to the external investor/lenders. External investors earn a large portion of the gross interest rate negotiated by and between the local lenders/guarantor and the borrower (M-Arca retains the difference as the syndication fee). M-Arca community lenders receive market guidance directly from the Android app to set borrower interest rates sufficient to compel external investor participation.

M-Arca structures participation fees in the form of a residual cash flow participation payable only after principal and interest payments due to the external investor have been paid in full.

**The Arca**

An Arca is a small hardware device similar in size and form factor to an AppleTV that functions as an agent to support M-Arca transactions. Arca's are available for purchase from participating retailers in Mexico for $750 M.N. ($45 dollars), and they are activated and automatically added to the M-Arca network after at least ten community users explicitly trust the device (and by proxy, the merchant), which in a few words means that the location in which the device is installed becomes the users' designated location for receiving US-originated wire transfers and conducting peer-to-peer lending activities. Arca owners earn transaction fees, mostly by acting as a cashier disbursing wire transfers and loan proceeds to recipients. Hosting an Arca is not only a great source of additional income for a merchant or homemaker, but it is also a customer draw for a merchant's core business.

Arcas work invisibly in the background, performing utility functions to support M-Arca's financial transaction operations. For example, the Arca is a gateway to post transactions to M-Arca's two public distributed ledgers and, it relays messages related to wire transfers and loans. Additionally, many M-Arca financial services activities require multiple parties to be present for some activities, or to cast votes of approval or disapproval, and the Arca facilitates and enforces these activities.

Arca's ideally are connected to a 110V power source and a broadband Internet connection via WIFI, or with an RJ-45 or USB cable. Both are optional however. An Arca can optionally be powered by solar panel that is sold separately for around $45 dollars, and, Internet communication can optionally be facilitated using a proprietary peer-to-peer protocol using participating Android mobile devices as "mules" to shepherd packets to and from the nearest available Internet connection.

Arcas are typically installed in an abarrotero located in or near the city centre of a rural pueblo, remote village, or even in an urban barrio. In fact however, anyone who can gain the trust of at least 10 M-Arca users in a single community can activate and operate an Arca. Other than the natural economic forces of supply and demand for services, there is no central authority nor policy limitation governing how many Arcas can operate in a given community, making growth of the M-Arca network entirely ad hoc and voluntary.

**Technology Influencing M-Arca**

M-Arca's financial services are simple, intuitive, reliable, fast, and competitively priced. But the services themselves and the requisite support processes underlying these services are anything but simple. A lot of technology exists under the hood to make everything work. That is, a lot of really sexy, really disruptive technology.

*On an aside, technologists tend to know for certain when they are truly innovating because when you are, and until you've earned broad market acceptance for your new gadget, it feels like you're standing in the Siberian frozen tundra. And that's exactly how we feel right now; though in our case it feels more like we're in the Canyon de Cobre in the remote Sierra mountains of Chihuahua.*

M-Arca is acting on the convergence of a handful of incredibly important, highly disruptive developing technology trends that are not yet visible to the naked eye, and at any rate are, for the most part, downright invisible to the international financial services community:

- Cutting edge digital identity and digital trust strategies being developed at MIT media labs.
- Equally cutting edge ideas to create trusted public registries using distributed ledgers made from cryptographic block chains.
- Advances in routing strategies for mobile ad hoc voluntary peer-to-peer networks.
- A proliferation of powerful Android smartphones entering the rural Mexican market, nearly to the point of saturation.

- An explosion of low-cost ASIC's that are now on the market. It's now possible for example, to mount an entire linux server on a single chip, together with WIFI and Bluetooth protocols included in the same chip package.
- Improvements to ASIC power consumption such that these can now be powered with newly improved low-cost solar panels.
- A profound streamlining in hardware design methodologies significantly reducing the number of engineers required to design, prototype, QC, and manufacturer in-line systems.
- Significant reductions in batch sizes required to achieve nearly full economy of scale in production manufacturing.
- Extraordinary improvements to the commercial quality of open source systems software and application stacks.
- Enormous improvements to accessibility and scalability of these open source software stacks via low-cost / no-cost cloud services providers.

This esoteric collection of seemingly unrelated technology trends converge, on the one hand, and in part, as an idea being popularised as the Internet of Things (IoT), largely manifested as wearable products like an Apple watch for example. Stepping back so as to soak up the bigger picture however, what this trend means to us is that **computationally intensive services can now be deployed on infinitely scalable mobile ad hoc networks made of powerful user-contributed equipment; especially in remote, previously inaccessible areas with sparse connectivity to electricity and Internet service.**

More specifically, our attention is drawn to the positive impact that these convergences can have on financial inclusion in rural Mexico. One of the nearly-alway-fatal obstacles to otherwise fantastic rural mobile banking business ideas is that Internet and electricity services are inconsistent and unreliable, and unfortunately, we're don't expect that to change in rural Mexico during our lifetimes. But, we will extend the Internet — for our purposes at least — by creating our own peer-to-peer network by co-opting community members' cell phones and by adding low-cost, self-powered, fixed-location network nodes in central locations in pueblos, like the abarrotero for example. The idea itself is hardly new. in fact, we're only marginally improving upon the way that postal mail has been delivered in rural areas around the world for centuries.

## ***Editorial Notes***

a) *The word "Arca" comes from the central Mexican prehispanic dialect Nahuatl and means literally, "Community Chest".*

b) *The hyphenation "M-Arca" represents a show of respect and a nod of street credibility to M-Pesa, currently the world's leading mobile-phone based money transfer and micro-financing service for the unbanked, launched in 2007 by Vodafone for Safaricom and Vodacom, the largest mobile network operators in Kenya and Tanzania.*

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