NEWS

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BITCOIN NEEDS TO GET ITS ACT TOGETHER

By early next year, key players must agree on a single solution or the currency could split in two

By and large, Bitcoiners are no strangers to adversity. In fact, they rather seem to welcome it. The community is a battery of contrarianism that lives off the loathing of every institution it seeks to usurp–banks, governments, payment processors. Like the psychic slime in *Ghostbusters II*, the community gets stronger with every hateful blow.

But what happens when dissent bubbles up from within Bitcoin? This is what we are now witnessing. In September, a pair of Bitcoin programmers, Mike Hearn and Gavin Andresen, splintered off from the central group of developers and released a competing version of the Bitcoin software, called BitcoinXT. It includes a controversial rule change that the pair argue will alleviate Bitcoin's snowballing scaling problem: At up to 1 megabyte apiece, the size of the components, or blocks, that make up the complete record of Bitcoin transactions (the blockchain) is widely agreed to be too small for the currency's future. But others warn that BitcoinXT's solution will place the currency on a path toward centralized control.

The greatest threat to Bitcoin's stability, however, is not the possibility that BitcoinXT will be adopted but rather that it will be only partially adopted. The new version is programmed to go into effect on 16 January 2016 if 75 percent of the main processors of Bitcoin transactions, called miners, signal their consent. (The percentage is calculated on the basis of computing »

Who Rules Bitcoin and What Powers They Have

KEY PLAYERS	ROLE	WHAT THEY CAN DO
Developers of the core Bitcoin client Maintainer: Wladimir van der Laan Key contributors: Gavin Andresen, Matt Corallo, Corey Fields, Jeff Garzik, Luke-Jr, Gregory Maxwell, Peter Todd, Pieter Wuille	Developers contribute new code to Bitcoin Core.	**Veto proposals** before they are incorporated into the source code, forcing dissenters, such as BitcoinXT's supporters, to publish a competing version of the source code.
Large miners and mining pool operators AntPool, BitFury, BTCChina, F2Pool, KnCMiner, Slush	At minimum, miners verify transactions, bundle them into new blocks, and broadcast them to other miners and full nodes. Responsible miners also validate new transactions. Miners are rewarded for their effort with bitcoins and thus also act as the mint for the currency.	**Vote** on whether to adopt BitcoinXT. It will be activated only **if 75 percent of miners signal consent** to the upgrade. Even then, miners will still be free to decide which of the two currencies they will mine.
Users and wallet providers Armory, Bitcoin-QT, BitGo, Blockchain, Electrum, MultiBit HD	Users are the people who create new Bitcoin transaction requests. They use software called wallets to relay requests to the Bitcoin peer-to-peer network. The software also provides users with their current balances.	**Choose one version** of the currency over the other. The more wallets compatible with BitcoinXT, experts think, the greater the value of that version of the currency.
Payment processors BitPay, Circle, Coinbase, GoCoin, Stripe	Payment processors offer software that acts as surrogate wallets for merchants that want to offer Bitcoin as a payment option but do not want to be exposed to the currency's volatility. They can conduct Bitcoin transactions for their clients and then pay the clients in nondigital currencies.	**Refuse to process payments** from one or another of the competing blockchains.
Full nodes Any user or miner may also operate a full node.	Full nodes are the traffic checkpoints on the Bitcoin network. Each node carries a complete version of the Bitcoin blockchain. When new blocks are added, full nodes refer to past transactions in order to verify that no bitcoins are being spent twice and that no fundamental rules have been broken.	**Cause confusion** if they refuse to upgrade. In particular, a situation could arise where wallets that do not independently verify new blocks (and therefore blindly trust other full nodes) initially accept transactions that they will later reject.
Exchanges Bitstamp, BTCChina, Coinbase, Coinsetter, Cryptsy, Kraken	Online exchanges facilitate trades between Bitcoin and other currencies.	**Choose which of the two currencies** they will list, effectively giving them control over the availability of each.

power.) However, there are many other agents in the Bitcoin peer-to-peer network–users, verification nodes, payment processors, and exchanges–all of which must be in agreement for the network to remain healthy (see table). Together they work to update and secure an ever-growing chain of transaction records that functions as the accounting ledger we call Bitcoin. All parties must agree on the rules of the game and run compatible software; otherwise the transaction chain can bifurcate into two separate chains with part of the network working on one and another

part working on the other. In Bitcoin, this is called a hard fork, and it results in two competing currencies.

To imagine the potential chaos of this scenario, consider what it would be like if your bank account suddenly underwent a digital mitosis, splitting into two nearly identical versions of itself but with slightly different names. And now imagine what would happen if the rest of the world couldn't agree on which version of your account was the official one.

"It's a really weird situation. It's not where you want to go. The thing about

money is it's useful because everyone accepts the same token," explains Wladimir van der Laan, a programmer from the Netherlands. Since April, he's been operating as the maintainer for the Bitcoin core source code, which basically means he makes the last call on what changes get folded into the ever-evolving Bitcoin software.

I met Van der Laan in Montreal in September after the close of a tense, hastily organized conference, the purpose of which, essentially, was to save Bitcoin. I asked him to speculate about all the

different ways that a fork could play out. And there are many (see table). Van der Laan did his best to sketch out how each player could muck up the works–causing wallet balances to go up and down sporadically and miners to waste their energy on coins that have no value–but in the end he just laughed. "We don't know," he said. "That's the problem. There's uncertainty. That's why everyone is afraid of this fork."

And that's why they all ended up in Montreal. Over the course of the weekend, developers put aside their flaring Reddit tempers and their gnawing Twitter grudges and began to carve out a strategy. They'll have to create a new protocol version that will obviate the BitcoinXT fork attempt by solving Bitcoin's scaling problem in a way that everyone can agree to.

In the past, forks have been avoided because developers like Andresen, Hearn, and Van der Laan have managed to reach a consensus before throwing the code to the public. But as the Bitcoin project has grown, so too has the clutter of voices and agendas. And agreement is no longer so easy to come by.

"We started with a world where Satoshi [Nakamoto] was God and what Satoshi said was the word of God," says Andresen, referring to the pen name of the anonymous Bitcoin architect. Now that Satoshi has gone silent and Bitcoin is in the hands of the people who use it, there are two possible ways forward. The developers could unite, salvage what remains of Satoshi's celestial aura, and continue to shepherd the Bitcoin core software as the one true protocol. Or Bitcoin could evolve by the laws of natural selection.

Undeniably, there is a vivid strain of anarchists in the Bitcoin community who would welcome a "survival of the fittest" approach. But if the Montreal conference is any indication, most of the developers favor a process whereby the people who know the most about Bitcoin take on the brunt of the decision making.

They have until January to prove they are fit for the job. —MORGEN E. PECK

MOLTEN SALT TOWER REBOOTS SOLAR THERMAL POWER

For the first time, solar thermal can compete with natural gas during nighttime peak demand

Solar power projects intended to turn solar heat into steam to generate electricity have struggled to compete amid tumbling prices for solar energy from solid-state photovoltaic (PV) panels. But the first commercial-scale implementation of an innovative solar thermal design could turn the tide. Engineered from the ground up to store some of its solar energy, the 110-megawatt plant is nearing completion in the Crescent Dunes near Tonopah, Nev. It aims to simultaneously produce the cheapest solar thermal power and to dispatch that power for up to 10 hours after the setting sun has idled photovoltaics.

"When the grid wants 110 MW, we'll provide 110 MW. There will be no variability," says Kevin Smith, CEO for SolarReserve, the plant's developer, based in Santa Monica, Calif.

Crescent Dunes, due to come on line by the end of this year, uses over 17,000 mirrors to focus sunlight on a heat receiver atop a 165-meter-high tower–a layout resembling California's massive Ivanpah solar power tower. However, while Ivanpah's receiver heats steam and pipes it directly to turbine generators, SolarReserve's heats a molten mixture of nitrate salts that can be stored in insulated tanks and withdrawn on demand to run the plant's steam generators and turbine when electricity is most valuable. Smith expects that NV Energy, the Las Vegas-based utility contracted to buy Crescent Dunes' output, will want it mostly dur-

PILLAR OF SALT: More than a million square meters of mirrors focus on a tower of molten salt to generate power for the Las Vegas Strip.