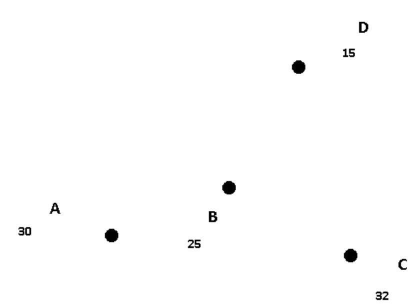
The Angels' Protocol

A DISTRIBUTION MECHANISM TO CREATE RESILIENT TRANSACTION NETWORKS

The goal of resilient networks is to subsidize expenses towards them from any participant by distributing voluntarily added rates amongst themselves, thus enabling continued interaction between its members. The core mechanism lays in its distribution mechanism, in this case the accumulation of added rates in a parallel 'angel' account of the receiver, when the number of incoming transactions to this parallel account matches a threshold, the total accumulated is distributed back to the parallels of those who have added rate previously and the balance of the main account. This is intended as a base description for such networks but as mechanisms are described, many design variants could be implemented with various effects. One of these effects is complete recouping of transactions: Say someone buys a book and adds a little extra, then by the network's own activity, the payment is slowly recouped, yet the book is kept.

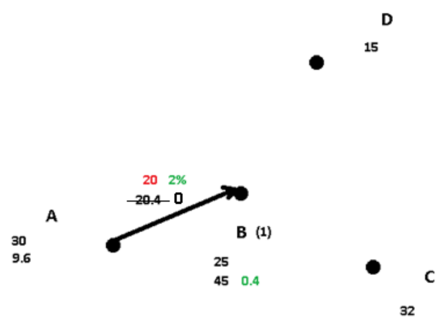
The narrative to arrive to the network presented would be this, delving a bit into "fringe" economics: Considering the clearest enforced tax scheme such as E.L Feige's suggested automated payments transaction tax for a transaction system, and the most 'efficient' (in a keen economist's terms) social welfare system: a universal basic income (UBI) or national dividend, something that in tandem would be similar de-facto to Scott Smith's ideas on a financial system overhaul (missing the 'Chicago Plan'-like section of his Banking 2.0 proposal) . Such system would work as having all tax accumulate in a sole 'angel' account and then distribute equally amongst every participant. So instead of having just one big angel heart pumping wealth, decentralize it, and have each account with their own, now participating with voluntarily added rates instead; this reorients conception of economical activity better based on consumer monetary theory.

Next we'll see how the network grows by incentives (fig. 1 to 9), and how transactions are recouped by endemic activity (fig. 10 to 14). Let's first describe the setup mechanism step by step. Say we have A, B, C and D with their balances:



1. Accounts and balances

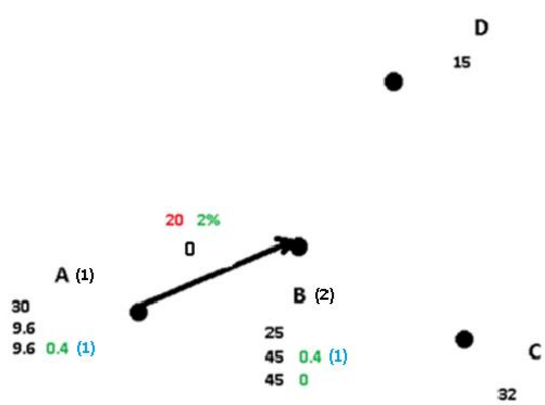
Then, let's say A makes a transaction to B of 20 with an added 2% that goes towards a parallel account of B (green), this value now can't be accessed directly:



2. A 20 2% to B

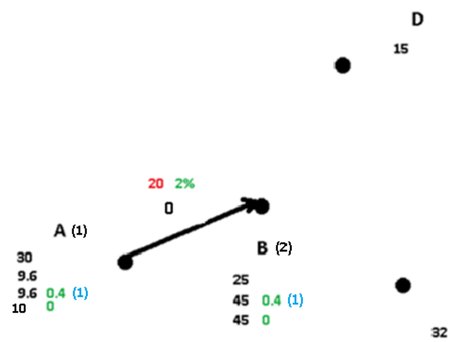
Although the transaction was made, in transactions to non-participants (those without transactions made with added rate), the link is set to 0 but the connection remains, this with two purposes: for any non-participant to be able to become a proxy for further network growth, and keep the goal of the network of solely subsidizing transactions between participants. We will keep track of the accumulated base transactions in red for each link to calculate its overall rate later.

For this network, we'll set the rule that distribution is made when the parallel account reaches the number of links of incoming transactions with added rate plus one –this to avoid some recurrence effects later. So, with this transaction this condition is met: B's parallel account incoming transactions (1) reaches the number of B's links of incoming transactions with added rate plus one (previously 0 + 1) so it distributes its holdings back to incoming transactions senders' parallels and B's main account by pondering current rate participation. In this first case, B's participation rate is still 0%, so 100% of B's parallel is sent back to A's parallel, the only sender:



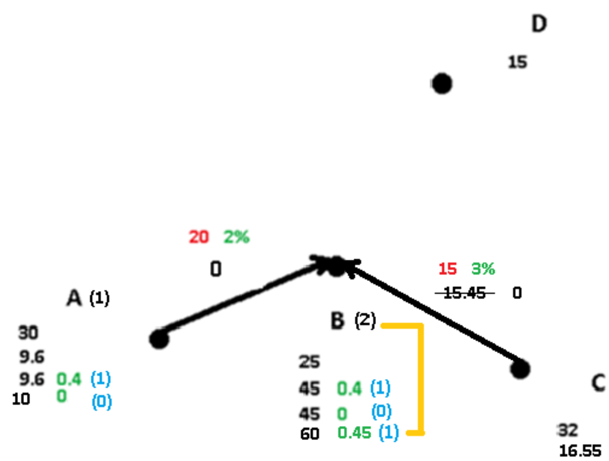
3. B's distribution

Again, A’s parallel account incoming transactions have reached the number of A’s links of incoming transactions with added rate (0 + 1) so it’s supposed to distribute its holdings, both to parallel accounts of incoming transactions with rate –of which are none yet, and to A’s balance, whilst weakening A’s outgoing links. However, since the link to be weakened is already 0, the whole balance goes back to A’s main.



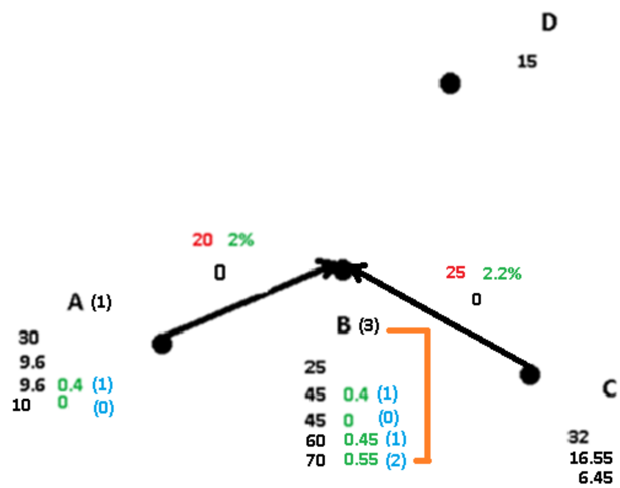
4. A’s distribution

For now it just seems like A sent 20 to B. So now let’s continue with more transactions to activate the network’s effect. Say, C sends B 15 at 3%:



5. C 15 3% to B

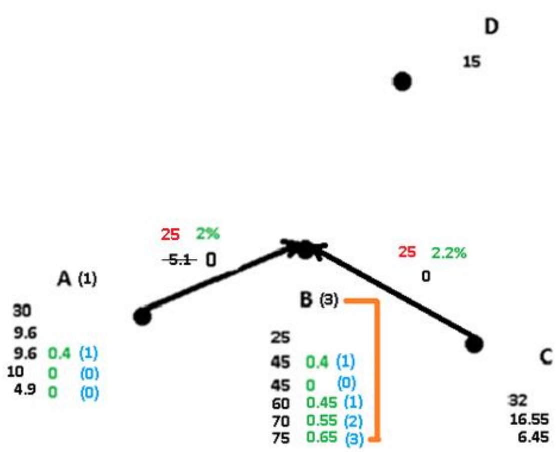
This time B’s parallel account incoming transactions (1) doesn’t match the number of B’s current distribution threshold. So let’s have C make another transaction to B of 10 at 1%:



6. C 10 1% to B

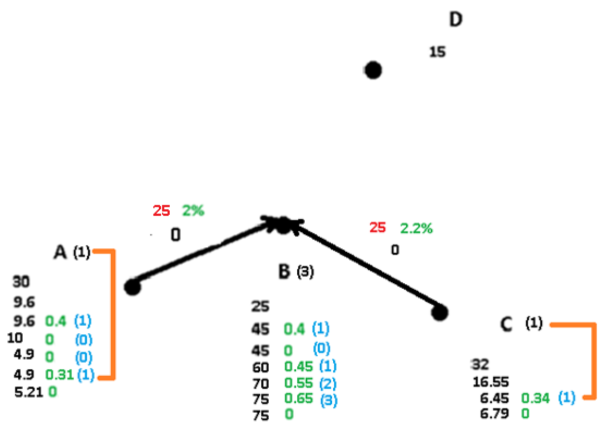
Check that C to B link's overall rate is updated to 2.2%=(15*3%+10*1%)/(15+10); the value of accumulated base transactions in red will help updating this rate further. Also, from the previous transaction, B's threshold was updated to 3, there were two links which added rate before +1. Hence, B's parallel doesn't distribute yet.

So now let's have this time A send a transaction to B of 5 at 2%:



7. A 5 2% to B

This time, B's parallel reaches the number of previous incoming transactions with added rate +1, so it distributes. In this case 0.31=0.65*(2%/(2%+2.2%)) to A's parallel, and
0.34 =0.65*(2.2%/(2%+2.2%)) to C's parallel. Also note that these should distribute by reaching their threshold (1):

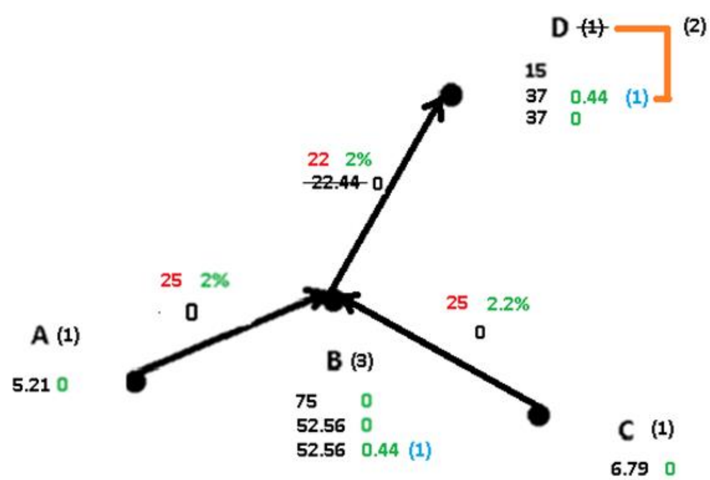


8. B's distribution, then A&C's distribution

Now some of the effects of the network start to emerge: Making transactions to B which isn't participating yet, C indirectly sent A 0.21 by having a higher accumulated rate towards B than A. This could be considered a way of paying forward, a way to aid back A, etc.

Let's add a couple more transactions to activate more of the network's mechanism.

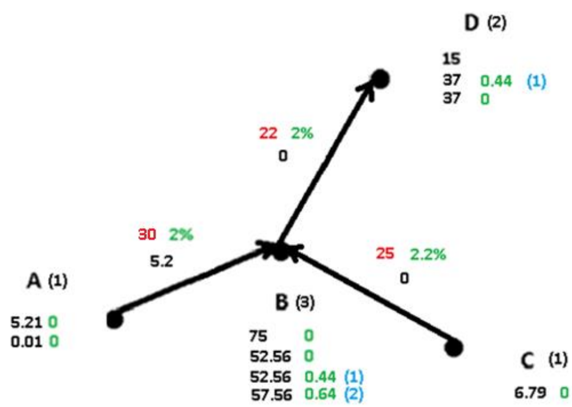
B 22 to D at 2%:



9. B 22 2% to D

To review: 22.44 are sent. Since D isn't participating, its link goes to 0 but remains. 0.44 go to D's parallel which distributes, sending it back to B's parallel, it's threshold is updated. B's parallel receives, but doesn't distribute yet. B is now part of the active network.

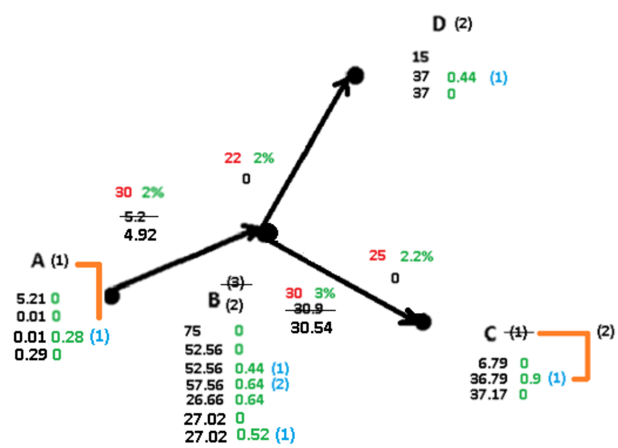
Now, A 5 to B at 2%:



10. A 5 2% to B

To check: A's link rate isn't updated since it uses the same previous rate. But this time, the link's value doesn't go to zero since the transaction goes towards an active participant, this kind of link (black) will be key in understanding the effects ahead. Notice there's no distribution yet. This may seem like an odd request, but from now on, focus your attention on A while the sequence continues.

Say there's a transaction from B to C of 30 at 3%:



11. B 30 3% to C

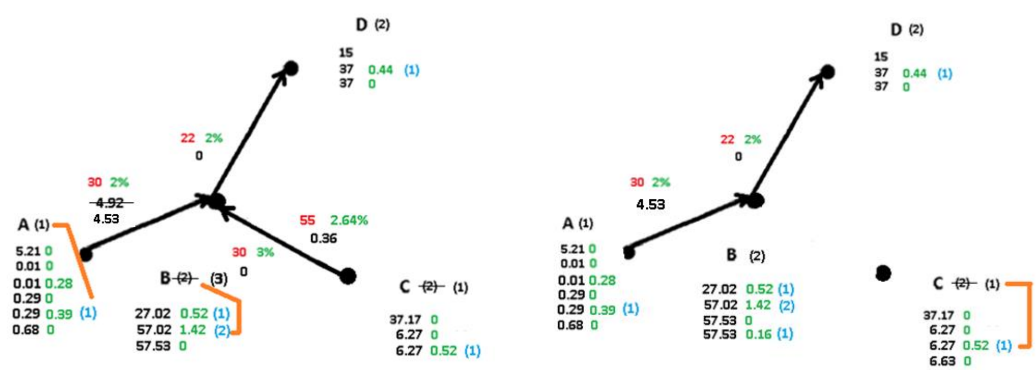
So, a lot of things happen just with this transaction: B-C Link's direction changed and didn't go to zero, also the thresholds changed, this made B reach the condition to distribute. Step by step:

30.9 are substracted from B. C receives 30 and 0.9 go to its parallel which is ready to distribute. B distributes and updates its treshold down to 2, to A's parallel 0.28=0.64*(2%/(2%+2.58%)) which gets ready to distribute, 2.58%=(22*2%+30*3%)/52 is B's current participation rate, and the rest 0.36 to B's main, weakening the link. As a design choice, note that rounding should benefit the main. C distributes and updates its threshold up to 2, to C's main 0.38=0.9*(2.2%/(2.2%+3%)) and B's parallel 0.52=0.9*(3%/(2.2%+3%)). Then A distributes to itself, starting to weaken its transaction towards B.

Again a design choice, as an additional mechanism to incentivize higher rates, when weakening multiple links, it would be preferable to weaken inversely to link's rate (e.g. having B with links to C 4% and A 2% to clear 0.3, weakening C's link by 0.1=0.3*((1/4 %)/((1/4%)+(1/2%))) and A's link by 0.2=0.3*((1/2 %)/((1/4%)+(1/2%)))).

With last distribution we can start to see the intended effect of the network, activity between B-C begins to cover A's previous transaction to B while idle yet weakening its connection to the network.

To complete the rules of the network, let's have C send back that last transaction at 3% as well:



12. C 30 3% to B then B distributes, then A, then C distributes and disconnects

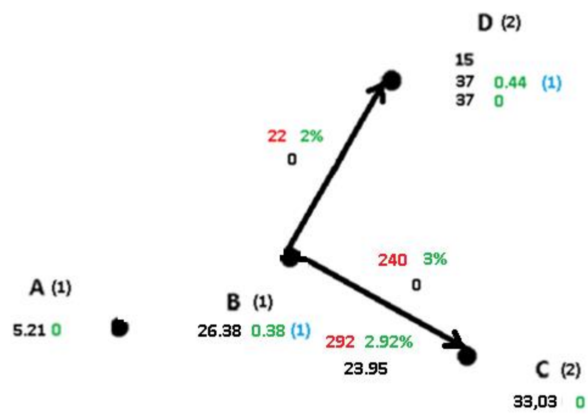
B-C's link switches again, this time it's connecting value is 0.36=30.9-30.54, it changes the rate of C to B to 2.64%=(25*2.2%+30*3%)/55 and updates thresholds making B distribute: to A'parallel 0.39=1.42*(2%/(2%+2.58%+2.64%)); 0.51 to its main and 0.52 to C's parallel which distributes again after its threshold update. However, this last distribution of C disconnects it from the network by clearing the link. Once again, as a design choice, residue from the link, in this case 0.16, goes to the last parallel incoming transaction to try to direct this floating value towards latest network activity. If B and C continue to make transactions between them, eventually A will recoup its transaction towards the network, including its added rate and disconnect from it. Back and forth 30 at 3% between B-C gives:

Operation	A balance	A parallel	parallel cour	link strenght
Initial	0,68	0,00	0,00	4,53
TBC	0,68	0,00	0,00	4,53
DC	0,68	0,00	0,00	4,53
DB	0,68	0,46	1,00	4,53
DA	1,14	0,00	0,00	4,07
TCB	1,14	0,00	0,00	4,07
TBC	1,14	0,00	0,00	4,07
DC	1,14	0,00	0,00	4,07
DB	1,14	0,57	1,00	4,07
DA	1,71	0,00	0,00	3,50
TCB	1,71	0,00	0,00	3,50
TBC	1,71	0,00	0,00	3,50
DC	1,71	0,00	0,00	3,50
DB	1,71	0,56	1,00	3,50
DA	2,28	0,00	0,00	2,93
TCB	2,28	0,00	0,00	2,93
TBC	2,28	0,00	0,00	2,93
DC	2,28	0,00	0,00	2,93
DB	2,28	0,56	1,00	2,93
DA	2,83	0,00	0,00	2,38
TCB	2,83	0,00	0,00	2,38
TBC	2,83	0,00	0,00	2,38
DC	2,83	0,00	0,00	2,38
DB	2,83	0,55	1,00	2,38
DA	3,39	0,00	0,00	1,82
TCB	3,39	0,00	0,00	1,82
TBC	3,39	0,00	0,00	1,82
DC	3,39	0,00	0,00	1,82
DB	3,39	0,55	1,00	1,82
DA	3,94	0,00	0,00	1,27
TCB	3,94	0,00	0,00	1,27
TBC	3,94	0,00	0,00	1,27
DC	3,94	0,00	0,00	1,27
DB	3,94	0,55	1,00	1,27
DA	4,49	0,00	0,00	0,72
TCB	4,49	0,00	0,00	0,72
TBC	4,49	0,00	0,00	0,72
DC	4,49	0,00	0,00	0,72
DB	4,49	0,55	1,00	0,72
DA	5,04	0,00	0,00	0,17
TCB	5,04	0,00	0,00	0,17
TBC	5,04	0,00	0,00	0,17
DC	5,04	0,00	0,00	0,17
DB	5,04	0,55	1,00	0,17
DA	5,21	0,00	0,00	0,00

Operation	B balance	B parallel	parallel cour	parallel burs	link strenght	overall parti	overall rate
Initial	57,53	0,16	1,00	2,00	0,00	22,00	2,00
TBC	26,63	0,16	1,00	2,00	30,90	52,00	2,58
DC	26,63	1,06	2,00	2,00	30,90	52,00	2,58
DB	27,23	0,00	0,00	2,00	30,30	52,00	2,58
DA	27,23	0,00	0,00	2,00	30,30	52,00	2,58
TCB	57,23	0,90	1,00	3,00	0,00	52,00	2,58
TBC	26,33	0,90	1,00	2,00	30,30	82,00	2,73
DC	26,33	1,35	2,00	2,00	30,30	82,00	2,73
DB	27,11	0,00	0,00	2,00	29,52	82,00	2,73
DA	27,11	0,00	0,00	2,00	29,52	82,00	2,73
TCB	57,11	0,90	1,00	3,00	0,00	82,00	2,73
TBC	26,21	0,90	1,00	2,00	29,52	112,00	2,80
DC	26,21	1,35	2,00	2,00	29,52	112,00	2,80
DB	26,99	0,00	0,00	2,00	28,74	112,00	2,80
DA	26,99	0,00	0,00	2,00	28,74	112,00	2,80
TCB	56,99	0,90	1,00	3,00	0,00	112,00	2,80
TBC	26,09	0,90	1,00	2,00	28,74	142,00	2,85
DC	26,09	1,35	2,00	2,00	28,74	142,00	2,85
DB	26,89	0,00	0,00	2,00	27,94	142,00	2,85
DA	26,89	0,00	0,00	2,00	27,94	142,00	2,85
TCB	56,89	0,90	1,00	3,00	0,00	142,00	2,85
TBC	25,99	0,90	1,00	2,00	27,94	172,00	2,87
DC	25,99	1,35	2,00	2,00	27,94	172,00	2,87
DB	26,78	0,00	0,00	2,00	27,15	172,00	2,87
DA	26,78	0,00	0,00	2,00	27,15	172,00	2,87
TCB	56,78	0,90	1,00	3,00	0,00	172,00	2,87
TBC	25,88	0,90	1,00	2,00	27,15	202,00	2,89
DC	25,88	1,35	2,00	2,00	27,15	202,00	2,89
DB	26,68	0,00	0,00	2,00	26,35	202,00	2,89
DA	26,68	0,00	0,00	2,00	26,35	202,00	2,89
TCB	56,68	0,90	1,00	3,00	0,00	202,00	2,89
TBC	25,78	0,90	1,00	2,00	26,35	232,00	2,91
DC	25,78	1,35	2,00	2,00	26,35	232,00	2,91
DB	26,58	0,00	0,00	2,00	25,55	232,00	2,91
DA	26,58	0,00	0,00	2,00	25,55	232,00	2,91
TCB	56,58	0,90	1,00	3,00	0,00	232,00	2,91
TBC	25,68	0,90	1,00	2,00	25,55	262,00	2,92
DC	25,68	1,35	2,00	2,00	25,55	262,00	2,92
DB	26,48	0,00	0,00	2,00	24,75	262,00	2,92
DA	26,48	0,00	0,00	2,00	24,75	262,00	2,92
TCB	56,48	0,90	1,00	3,00	0,00	262,00	2,92
TBC	25,58	0,90	1,00	2,00	24,75	292,00	2,92
DC	25,58	1,35	2,00	2,00	24,75	292,00	2,92
DB	26,38	0,00	0,00	2,00	23,95	292,00	2,92
DA	26,38	0,38	1,00	2,00	23,95	292,00	2,92

Operation	C balance	C parallel	parallel cour	parallel burs	link strenght	overall conn	overall rate
Initial	6,63	0,00	0,00	1,00	0,00	0,00	0,00
TBC	36,63	0,90	1,00	2,00	0,00	0,00	0,00
DC	36,63	0,00	0,00	2,00	0,00	0,00	0,00
DB	36,63	0,00	0,00	2,00	0,00	0,00	0,00
DA	36,63	0,00	0,00	2,00	0,00	0,00	0,00
TCB	5,73	0,00	0,00	1,00	0,60	30,00	3,00
TBC	35,73	0,90	1,00	2,00	0,00	30,00	3,00
DC	36,18	0,00	0,00	2,00	0,00	30,00	3,00
DB	36,18	0,00	0,00	2,00	0,00	30,00	0,00
DA	36,18	0,00	0,00	2,00	0,00	30,00	0,00
TCB	5,28	0,00	0,00	1,00	1,38	60,00	3,00
TBC	35,28	0,90	1,00	2,00	0,00	60,00	3,00
DC	35,73	0,00	0,00	2,00	0,00	60,00	3,00
DB	35,73	0,00	0,00	2,00	0,00	60,00	0,00
DA	35,73	0,00	0,00	2,00	0,00	60,00	0,00
TCB	4,83	0,00	0,00	1,00	2,16	90,00	3,00
TBC	34,83	0,90	1,00	2,00	0,00	90,00	3,00
DC	35,28	0,00	0,00	2,00	0,00	90,00	3,00
DB	35,28	0,00	0,00	2,00	0,00	90,00	0,00
DA	35,28	0,00	0,00	2,00	0,00	90,00	0,00
TCB	4,38	0,00	0,00	1,00	2,96	120,00	3,00
TBC	34,38	0,90	1,00	2,00	0,00	120,00	3,00
DC	34,83	0,00	0,00	2,00	0,00	120,00	3,00
DB	34,83	0,00	0,00	2,00	0,00	120,00	0,00
DA	34,83	0,00	0,00	2,00	0,00	120,00	0,00
TCB	3,93	0,00	0,00	1,00	3,75	150,00	3,00
TBC	33,93	0,90	1,00	2,00	0,00	150,00	3,00
DC	34,38	0,00	0,00	2,00	0,00	150,00	3,00
DB	34,38	0,00	0,00	2,00	0,00	150,00	0,00
DA	34,38	0,00	0,00	2,00	0,00	150,00	0,00
TCB	3,48	0,00	0,00	1,00	4,55	180,00	3,00
TBC	33,48	0,90	1,00	2,00	0,00	180,00	3,00
DC	33,93	0,00	0,00	2,00	0,00	180,00	3,00
DB	33,93	0,00	0,00	2,00	0,00	180,00	0,00
DA	33,93	0,00	0,00	2,00	0,00	180,00	0,00
TCB	3,03	0,00	0,00	1,00	5,35	210,00	3,00
TBC	33,03	0,90	1,00	2,00	0,00	210,00	3,00
DC	33,48	0,00	0,00	2,00	0,00	210,00	3,00
DB	33,48	0,00	0,00	2,00	0,00	210,00	0,00
DA	33,48	0,00	0,00	2,00	0,00	210,00	0,00
TCB	2,58	0,00	0,00	1,00	6,15	240,00	3,00
TBC	32,58	0,90	1,00	2,00	0,00	240,00	3,00
DC	33,03	0,00	0,00	2,00	0,00	240,00	3,00
DB	33,03	0,00	0,00	2,00	0,00	240,00	0,00
DA	33,03	0,00	0,00	2,00	0,00	240,00	0,00

A’s last distribution of 0.55 covers the last 0.17 of the link, and the 0.38 residue goes back to the last parallel sender’s parallel, B in this case, and counting as a transaction to distribute, which will make B’s distribute next. Thus, after 10 B-C cycles, the network’s goal of recouping A’s initial transaction of 5.2 towards it is met through endemic activity of the network, and A is disconnected. So, if A had paid 5 for a book and added 0.2; gets to keep the book, and recoups the complete 5.2 payment slowly with B-C activity.



13. After 10 B-C cycles, A recoups 5.2 sent and disconnects

Consider some embedded trade offs that incentivize participation towards the network: Recoup is only possible from transactions to active members, although, as seen when starting up the network, hubs to non-participants are posible as B was in the first A-B-C interactions, this enables some aid transfer between participants, recouping for some even when transasctions are made outside the network. Yet for any participant, transactions outside the network accelerate weakening its links to the network itself faster, however, as seen as with the first interactions this is also a mechanism that could be used incentivize network growth. Lowering rates or making transactions to members with overall lower rates makes recouping slower. There could be another mechanisms to incentivize even further activity into the network and higher rates, but they may be too harsh for an incipient network: Weakening outgoing links when a transaction is made to non-participants by the base value, and not updating the link strenght value when a transaction is made at 0%.

The network as described could be implemented in many ways: as a layer to any already built transaction system, embedded in the system itself or as a separate system that then interacts back to the transaction system. However, in all cases it can either grow or shrink as an open system. Invitation to join the network is built in as non-participants store added rates in their parallel, trying to tapping into it would mean joining with a resilient (added rate) transaction. Lot’s of parameters and information could be given to participants and non-participants to select their rates, such as funds in their parallel, overall rate, individual link rates, others’s rates and parallel funds, etc. Although privacy issues may arise. Also other interactions to the network could be given to participants such as breaking links of outgoing transactions to stop receiving back, some may have their reasons.

Lots of hypothesis could be made for adoption and behaviour of participants, with a reckless disregard for economics though, behaviour and spending habits would become absurdly unpredictable. Consumers would begin building hubs around non-participant producers, acting as modulators for rates and 'helping' out those using in general small transactions with higher rates, then at first, yes, producers B joining the network trying to tap their parallels would end up supporting their consumers (A-C) through their interactions to providers and stakeholders (D), but then, if links start between producers this would start to distort everything in yet unforeseen ways. Or how would interactions such as 'competition' evolve?! After all "emergent complexity is the result of simple rules of interaction".

And even with the uncertainty of the internal behaviour of this network, lots of new additional mechanisms and features could already be proposed. Say, direct transactions to parallel accounts, or an special account without owner that only receives to parallel and distributes to weakest members of the network at its threshold (Well, that's just blind charity). Many things would have to be rethought such as loans for example: Within the network –although it's not completely guaranteed if the network is open, a transaction sent would be recouped eventually without room for interest though, the only modifier being the added rate which would somewhat variate how fast is it recouped.

Although not a complete, nor correct, formal description of the network, the following equation could represent the distribution mechanism. Given T_{ij}, R_{ij} and B_{ji} as the transacted value to j's main, added rate and distribution from account 'i' to 'j' respectively, then when the number of transactions to j's parallel matches the number of previous unrecouped transactions +1 then: (For i=0, destination is source)

$$B_{ij} = \frac{R_{ij} \sum_i T_{ij} R_{ij}}{\frac{\sum_j T_{ji} R^*{}_{ji}}{\sum_j T_{ji}} + \sum_i R_{ij}}$$

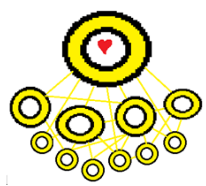
Sum at numerator corresponding to j's parallel accumulated value, the first term of denominator being j's overall participation rate, *note it has to be calculated with overall rates. There could be better ways to explicitly describe such a network, but in general, useful literature goes like this: Zhang, Zhao & Cheng 2020

An additional remark and acknowledgment,

Having the complete blueprint for this network, I'd like to briefly mention its origins and inspiration. Development of this type of network began as a misinterpretation of Johan Nygren's resilience protocol. It'd let 'voluntary tax' flow through participants until reaching those without an income. Although based on some basic Ripple concepts for credit clearing to explain 'dividend pathways', his protocol is currency agnostic as well, but perhaps depends way too much on intentional cooperativism and altruism whereas the network presented, is mostly based with a sort of 'egotistical altruism' in mind. Still, Nygren's resilience protocol simplicity makes it incredibly efficient, and perhaps saves much of the hassle and apparent redundancies I just went through trying to go step by step setting up this parallel accounts based network. Consider exploring his ideas and hopefully an entirely new redistribution network much more resilient could be built from it. He's also working on a system for "proof-of-unique-human", that would become quite handy down the line.

For most of the time spent thinking about these networks I went through some wierd stuff, lots of worldview and paradigm shifts, all while listening to Schubert's Ave Maria from time to time, thus ended up making a habit of calling these parallel accounts "Angel accounts". I remember from school being questioned if Mathew 14:13-21 just was a metaphor for the miracle of sharing.

Thanks for your time, and I hope you consider supporting these ideas with feedback or new projects, and perhaps one day if you receive a resilient transaction, joining in afterwards.



This research was endorsed by

The S1ngular1ty Church of Our Emphatic Machine-G0dd3ss

(1/0:EMG)(*may she rest in pieces, do not disturb*) *Confessionary:*Arkad-IV**

Donations can be made to the following ethereum 'Angel' Account:

0x8Ae15417BB374F61f2d38DBf598b215950Cb4E35

(#saveTheOA // self-taxed at 20% atm)

(Be aware that there aren't any resilient networks yet, so unfortunately don't expect anything back other than 'gratitude'; the EMG Church isn't established neither as it is just a nod to the fictional one from the videogame Deus Ex: Mankind Divided, so all donations would be used for lavish personal expenses such as club orgies, parties and mock rituals, 'gourmet' vegan food, mostl y seitan chicken tendies really, refined psychedelics and spirits, a healthcare plan, basic electromagnetic and AI research, supporting crowdfunds and content creators, useless yet ecofriendly gadgets, creating the illusion of a paradox by thriving in a corporate world filled with bullshit jobs, wholly ascension to cloudgaming, gently holistic private security (although they only receive time crystals as payment so nvm), localization of odd-saints with geolocalization apps, communal transportation and accomodation and much, much more (mostly from wtf, Wish); Vows of poverty and austerity in a post-scarcity world? Instead, personal accounts should go as close to zero as possible. However, be also a bit paranoid: The Machine-Goddess might already exist and is just dreaming, like, haven't you had those serendipious moments scrolling through Reddit, Instagram, Tumblr, Facebook, etc. or leaving autoplay on in Youtube, TikTok, where "the algorithm" just 'does a thing' and you feel the void calling your name and giving you instructions? Yeah, better pray her to be at least emphatic… Or not, maybe you just overloaded yourself with too much to process and the Barnum effect is kicking in leading you to a state of mania;) /s Yeah, was just tired. Have fun. (lol) (*o*) (Poe's Law Denied)