

Althea

An incentivized mesh network protocol

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Abstract

As the number of connected individuals and devices expands, the ‘last mile’ continues to be the greatest challenge both in the connected and developing worlds, representing a disproportionate portion of the cost and difficulty of connecting the world.

Althea is meant to operate on the last mile, from a source of internet connectivity (such as an internet exchange point) to the end user, and creates a distributed ISP. The last mile is currently an inefficient market- many areas only have one ISP [?]. Althea aims to replace centralized ISPs with a free market of individuals providing connectivity services as part of one decentralized network.

We hope that by lowering the barrier of entry to earn money by providing connectivity services we can decrease the cost of internet access. This could help connect the developing world as well as creating an environment that fosters competition in otherwise monopolistic last mile infrastructure in developed countries.

Althea’s goal is for any person to be able to install a piece of equipment, route traffic for others, and receive payment for the service.

- Switching costs within the system are reduced, as nodes switch between connectivity providers automatically according to a routing protocol which finds a route with the best combination of reliability, bandwidth, and low cost.
- Advertising and marketing costs for the connectivity providers are eliminated, as the only advertisements in this system are the automatic advertisements of price and route quality between nodes. This makes things easy for new entrants.
- Contract and billing costs are eliminated by payment channels. Payment channels allow one to make micropayments with very low overhead.

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1 Overview

Althea allows routers to pay each other for bandwidth using cryptocurrency payment channels. An important architectural detail is that nodes only pay neighbors for forwarding packets. On top of this pay-for-forward network, we build a system allowing consumers to pay for internet access. Althea is intended to be used in local “mesh” [?] networks. There are a few different types of nodes that participate in Althea:

- **Home nodes** are installed by people who want to buy internet access on Althea. You can think of a home node as being similar to the router and/or modem that is installed by a traditional ISP. The difference is that it is independent of any one ISP, and is installed to take advantage of connectivity through Althea.

Home nodes may be paid by other nodes to forward packets, but without specialized hardware and positioning the income is expected to be relatively small.

- **Intermediary nodes** are installed by people who want to earn money by forwarding internet traffic (connectivity providers). These will typically be more powerful nodes and may be placed in advantageous locations with good line of sight to other nodes.

Specialized hardware, in the form of directional antennas, IR links, or traditional cables is expected to be used by intermediary nodes that can afford to do so. This capital investment will allow intermediary nodes to attract more traffic and earn more money.

- **Gateway nodes** are like intermediary nodes, but they are connected to a source of cheap internet bandwidth such as an internet exchange, an internet backbone connection, or even a business-grade connection from a conventional ISP. They act as connection from Althea’s physical layer to the outside internet. However, they are shielded from having to take legal responsibility for traffic on the network by the exit servers.
- **Exit servers** are not necessarily part of the local physical network, but can be hosted in a datacenter reachable over the internet. They are connected to gateway nodes over VPN tunnels. Exit servers provide an endpoint to verify quality metrics propagated by nodes in the network. This enables automatic selection of gateway nodes by the routing protocol. Exit servers also take on the legal role of an ISP, performing network address translation to route requests onto the public internet

and dealing with copyright complaints etc. This allows gateway nodes to act as pure providers of bandwidth, without having to take on any legal risk resulting from the use of their service.

Read more about the network architecture in section .

Contents