

Proposal: Polkadot web2/web3 API middleware development

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Date: 17.03.2023

Requested DOT: 76,620

Requested USD: 463,627.62

EMA7: 6.051

Short description: Development of an open-source web API system to 'bridge' enterprise IT and the Polkadot blockchain ecosystem.

1. Executive Summary

The goal of this proposal is to develop an open-source technology which provides a 2-way API gateway between web2/3/in-house applications and the Polkadot ecosystem including all its parachains, thereby enabling easy integration of Polkadot and all its parachains with traditional Enterprise applications and new web3 solutions.

We envision this technology enabling the creation of many SaaS offerings, providing the gateways services with varying SLAs, industry domains, and geographic regions. By way of these gateways traditional enterprise software products and services would be provided a bi-directional communication channel with the Polkadot relay chain and all its parachains. The Gateway API will enable enterprise organisations to onboard their users and enable them to interact with any Polkadot parachain transparently, without having to directly own and manage the chain's native tokens, or any crypto at all, or even understand complex blockchain technical concepts.

2. Context of the proposal

Aventus Network (AvN) is an enterprise-focused, scalable, sustainable and interoperable blockchain which is built on Substrate. It currently operates as a layer 2 on Ethereum, additionally, AvN is a parachain of Polkadot ([ParaID 2056](#)). To date, Aventus' enterprise-grade modular architecture has supported use cases including [NFTs](#), [video games](#), [loyalty schemes](#), [event ticketing](#), supply chain provenance and [cargo management](#). The AvN has processed over 32m transactions in production with 2.5m active wallets to date which can be seen on the block explorer: <https://explorer.mainnet.ventus.io/>.

Aventus' mission is to bring blockchain into Enterprise by making building on Polkadot, Ethereum and beyond accessible for companies in any ecosystem.

Aventus has developed an enterprise blockchain middleware solution - [Aventus Gateway](#) - which provides a way for web2/web3 application developers to incorporate state-of-the-art blockchain services into their architecture without needing to directly manage wallets, run and manage nodes, pay or own crypto, or even understand blockchain technology at a deep level. Instead, they rely on the familiar concept of always-on JSON-RPC API, accessed via HTTPS endpoints using common techniques and tools.

This is currently delivered as:

- Public SaaS which consists of a cloud infrastructure which operates a publicly-accessible end-point.
- Software solution to build a SaaS offering (with a set of public or private end-points) for those who require guaranteed levels of service.

Users can leverage a companion npm library that facilitates the creation of requests, authorisation and endpoint discovery, but can also implement their own logic towards constructing the requests.

At present, we have customers who demonstrated both approaches' viability. The Gateway charges fees for each transaction request, but state queries are free. These fees cover both the network operation and the expense of the relayer service's infrastructure.

3. Problem statement

The proposal aims to solve the problem of connecting the traditional enterprise software domain and the entire Polkadot blockchain ecosystem **by extending and enhancing Aventus Gateway's API to support Polkadot relay chain and all its parachains.**

4. Proposal Objective/solution/s to point 2

The goal of the proposal is to develop an open-source solution, and a SaaS offering, to provide a two-way API gateway between internet web2/3 or in-house applications and the Polkadot ecosystem. Currently traditional software providers face multiple challenges integrating blockchain into their solution architecture, namely:

- Lack of technical domain knowledge in blockchain, and specifically Polkadot and its parachains. Diversity in the ecosystem makes this challenge even more significant.

- Comparatively immature blockchain enterprise software stack, absence of developed middleware solutions and cloud services which are ‘a given’ in the traditional layered enterprise architecture.
- Traditional businesses’ compliance, legal and accounting incompatibility with crypto, especially with staking or custody of crypto-funds.

Aventus Polkadot Gateway solution would address these challenges by offering a scalable and highly available platform, which can be run by individuals and organisations for private consumption or as a public service, thus enabling the emergence of a decentralised industry of API infrastructure providers which will underpin the growth in hybrid web2/web3 applications.

a. Split-fees logic

This technology would, for example, enable enterprise organisations to onboard their users and enable them to interact with any Polkadot parachain transparently, without having to directly own and manage the chain’s native tokens, or any crypto at all.

Organisations will have options to choose from when deciding on the format of their commercial relationship with their customers. We hope this will open the door to more companies adopting or migrating to polkadot and significantly accelerate active user and transaction growth by bringing users who may be currently discouraged by the risks and challenges of a new technology like Blockchain.

Aventus Gateway allows the sender to specify a payer account to be responsible for paying the AVT (Aventus token) costs on the Aventus Network, while the sender itself authorises the token (value) transfers from its own account. By virtue of expanding the coverage of Aventus Gateway to the rest of the Polkadot ecosystem, we therefore will enable the usage of this capability in other parachains and Polkadot itself. Thus the payers, who of course would also need to ‘agree’ to pay for the transactions, effectively would finance users’ blockchain activity by maintaining and managing an appropriate token balance. This enables service providers to avoid having to expose business clients and their end users to relatively complex blockchain technology concepts (such as “gas”, “minting fees” etc). This would let users deal only with business concepts they understand, for example, ownership and buying/selling of digital art.

b. Architecture

Our goal is to extend Gateway proxying logic so that we can target not only endpoints (pallets and methods) present on the AvN but also any public

endpoint present on other chains in the Polkadot ecosystem. This would require the development of following modules:

- Extension of existing authentication, authorization and audit (AAA) capabilities.
- A new traffic management and request routing system capable of advanced configurations to support clients' dApp A/B testing, canary deployments, and staged rollouts with percentage-based traffic splits.
- A redesign of the architecture to support multi-network and multi-format transaction submission.

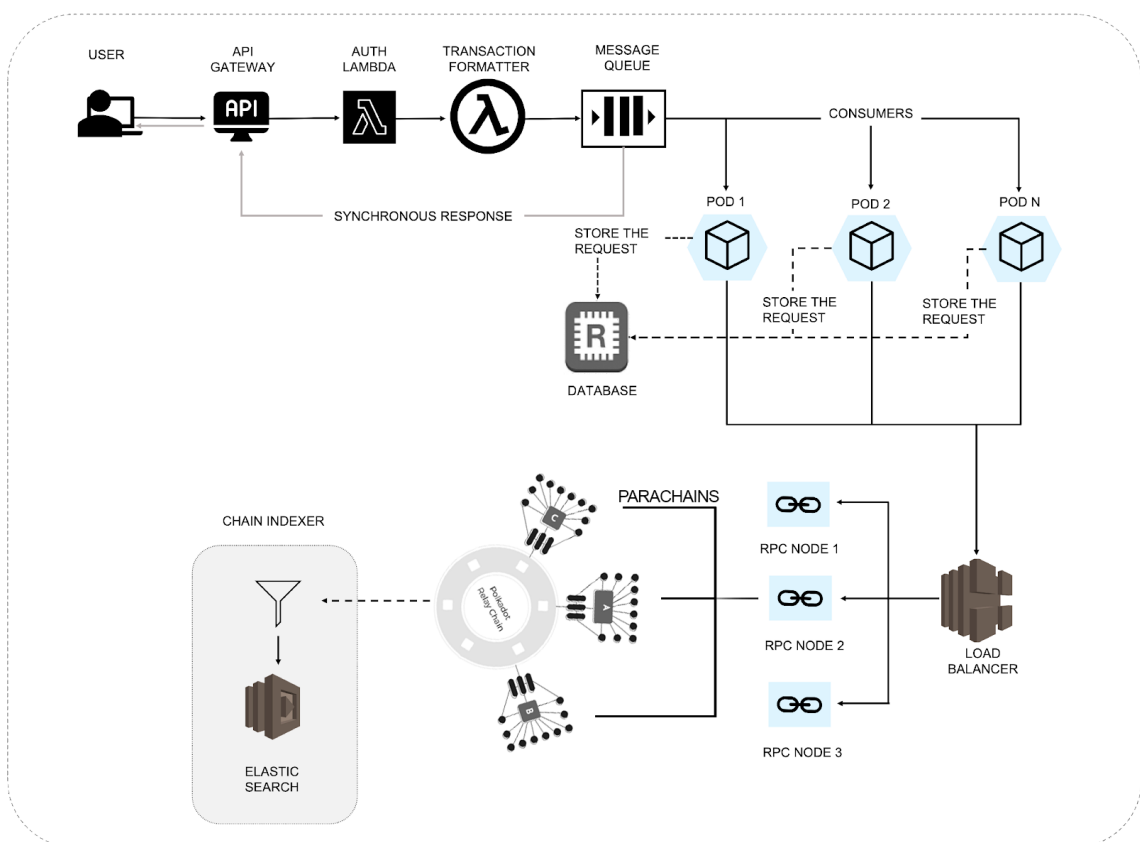


Figure 1. Simplified diagram of the solution architecture.

c. Stakeholder benefits

By creating a middleware solution for interoperability and integration of blockchains with web2/3 and enterprise systems this proposal benefits the Polkadot community as a whole: all parachains and the entire Polkadot ecosystem. This will immediately enable new and existing parachains to offer out of the box integration gateways into their networks. Potentially it will also trigger the emergence of a decentralised industry of API service providers

reducing barriers to entry and accelerating seamless fusion of traditional IT and Polkadot. This would drive adoption of the Polkadot blockchain ecosystem, bring new users, transaction workloads and enable the emergence of new business models.

d. Milestones and tasks to include

The scope of work, milestones and timeframes are outlined in the table 1 below. The duration is expressed in calendar months, the execution of the tasks is not sequential, i.e. they overlap.

Table 1: Scope of work and milestones.

Miles tone	Duration	Component	Cost	Description
0.1	2m	AAA capabilities	\$93,103	Enterprise-grade authentication, authorisation and audit capabilities are required to enable providers and their client to differentiate between clients and their users to enable sustainable business models of operation, some of which would rely on the split-fee capability (subsidising user transaction costs to provide seamless UX) : - Enable 'token gating' users for gateway/chain access. This will allow API-providers to be selective in terms of clients able to use Gateway API to access the network. The selection criteria is flexible, one example of the simplest scenario would be to provide access to accounts with non-zero native token balances. Any token (including an NFT) and/or any volume of the token can serve as an access criteria. - Web2 authentication access - traditional web access authentication method for applications/users (we will consider integrating with enterprise Single Sign On technology). - Web3 (address-based) access - Per-endpoint address-based access list including administrative API and UI. This would enable a simple manual (from UI) or API onboarding of user addresses. This functionality would also enable differentiation on quality of service, or

				throttling rate or limiting number of transactions depending on the user/client.
0.2	3m	Chain driver plug-in architecture	\$139,654	Plug-in architecture to support custom drivers for different parachains with signing module, transactions (re-) formatting capability, and chain-agnostic request execution workflow. This requires: - rebuilding of the internal processing pipeline to decouple chain-specific functionality from generic interface, queueing and backend - redesign of the execution workflow to enable flexible configuration for multi-chain support - support for independent lifecycle/development of drivers and core API system, non-downtime driver upgrades with zero transaction loss or disruption to transaction ordering - definition of the external and internal 'plug-in' API, its documentation and deprecation policy
0.3	3m	Infrastructure as code, deployment automation tooling	\$179,988	The gateway is architected as a modern cloud-based web-platform utilising multiple services such as lambda, API gateway, RabbitMQ and others. This allows for PROD-level SLAs and commercial grade scalability, as well as modern software engineering practices for developers integrating their applications with it. The scope of the work includes AWS-targeted: - terraform - ansible - k8s/docker and multiple other services to create CI/CD for timely deployment and upgrades with limited or no downtime.
0.4	1m	Testing and Documentation	\$46,551	Test the Gateway API and create external documentation enabling 3rd party developers to deploy, run and maintain, extend and customise the system for their purposes.
1	5m	First production release	\$459,296	

Note 1: Implementation of non-functional requirements (scalability, performance, availability, etc) is out of scope for this project.

Note 2: Running production PaaS/SaaS offering is out of scope for this proposal, the corresponding infrastructure and labour costs are not included here.

Resourcing of this project will require a small development team staffed and costed as follows

Table 2. Staff costs breakdown

Role	Quantity	Monthly rate	Use	Duration	Cost (USD)
DevOps engineers	2	£10,000	100%	5	\$121,000
Architect (Senior Developer)	1	£12,500	70%	3.5	\$52,938
Engineering Lead (Senior Developer)	1	£10,833	100%	5	\$65,542
Senior Developers	2	£10,000	80%	4	\$96,800
Mid-level Developer	1	£7,500	80%	4	\$36,300
Junior Developer	1	£5,833	80%	4	\$28,233
Developer in Test	1	£5,833	80%	4	\$28,233
Scrum master/Project manager	1	£5,000	100%	5	\$30,250
Total staff					\$459,296
GBP/USD	1.21				
Project duration (months)	5				

5. Why Polkadot Network?

Aventus Network is a substrate-based Polkadot para-chain. We brought into the Polkadot ecosystem our infrastructure, transaction loads and clients. We are firmly embedded in the Polkadot ecosystem and would like to offer our technology and apply our skills for the benefit of the wider community.

6. Payment conditions.

Rate to use

DOT allocation to be calculated upon on-chain submission using EMA7 rate: <https://polkadot.subscan.io/tools/charts?type=price>.

Submission

This project proposal will be submitted as a single proposal in the scope defined in this document.

This project forms part of a more comprehensive long running initiative to introduce a publicly accessible enterprise grade technology bridging the domain of enterprise/cloud software and Polkadot ecosystem. Other proposals to further extend and develop the solution after the delivery of its current scope will be submitted separately.

Delivery

The software will be delivered as an open-source code repository under the Aventus github account: <https://github.com/Aventus-Network-Services>.

7. Comments, Qs&As

Our team has developed a production-grade Gateway API for Aventus Network, the costs and the duration of this project have been estimated based on that experience. The nature of the project requires it to be staffed by permanent employees to ensure continuity and alignment of incentive, which is reflected in the cost structure.

For the avoidance of doubt, we are not seeking to recoup cost spent to date, only for the extension of the capabilities to make the product general purpose enough to be used by the DotSama ecosystem as a whole.

Aventus development team are experts in building full-stack enterprise solutions and cross-platform development. We have mature development and management processes, our work, deliveries and spending are independently audited on a quarterly basis.