

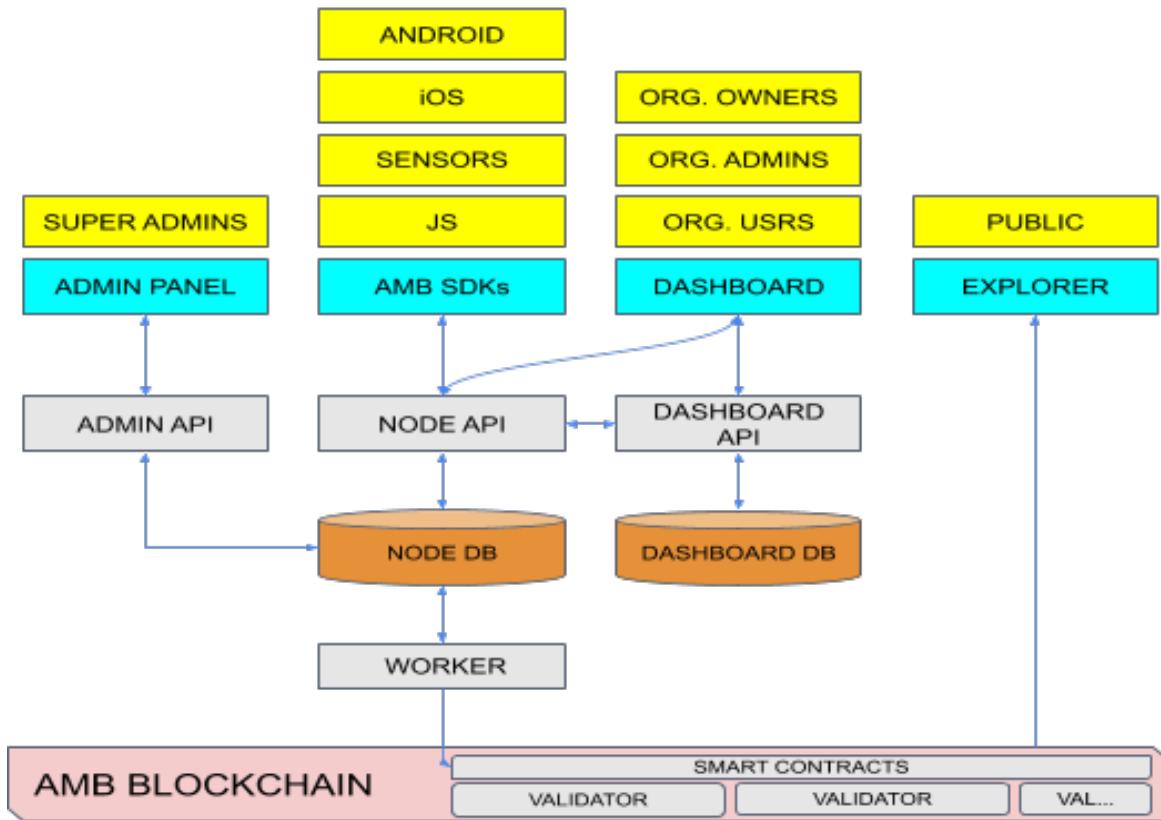
A complex network of interconnected nodes (represented by small circles) and lines (edges) in shades of purple and blue, forming a dense web-like pattern across the entire page. In the upper right quadrant, there is a large, stylized graphic of a human eye. The eye is pink and purple, with a dark purple keyhole icon positioned in the center of the iris. The overall theme suggests a focus on privacy, security, and surveillance within a decentralized network.

Hermes Masternode

Technical Design

Introduction

The Hermes Masternode is the crucial tool that Ambrosus has built to allow widespread commercial access to the Ambrosus Ecosystem. It is through Hermes Masternodes that data is integrated into applications, or sent to the Ambrosus blockchain. Due to the fact that the vast majority of entrepreneurial solutions built on AMB-NET utilize a Hermes Masternode, a detailed overview of the Node itself, and why it is important is provided below:



The Hermes Masternode is the digital link between the Ambrosus blockchain, the physical world, and the existing internet of information. More precisely, the Hermes Masternode is responsible for 1) receiving data from sensors and other existing IT systems, 2) segregating public from private data, 3) uploading all meta-data into bundles on the blockchain, and then 4) allowing dApps to connect and display data stored on the blockchain to different users. The administrator of each Hermes Masternode is also responsible for deciding who is

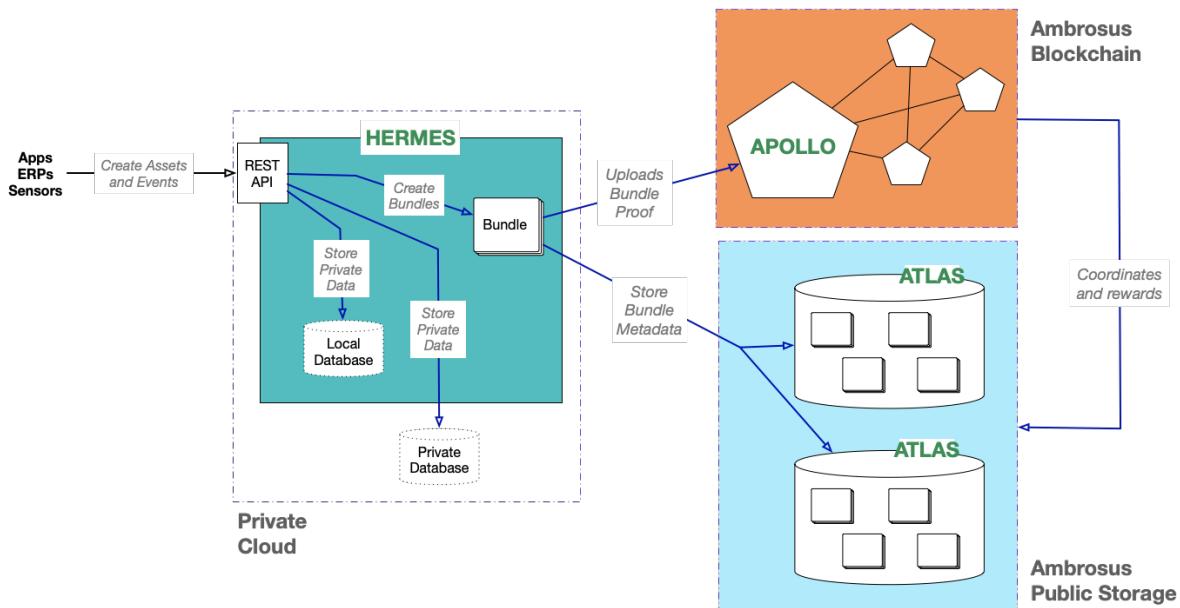
Hermes Masternode: Technical Design

allowed to upload data onto the blockchain, how long that data will be stored for, and when such data will be paid for.

With such functionality, the Hermes Masternode becomes the vital component of the Ambrosus Ecosystem: as the ‘proxy’ between the internet of information and the Ambrosus blockchain, Hermes allow data to flow from the external world of physical objects to the digital world of the blockchain, and subsequently into any application or interface with the relevant security permissions (public, private, semi-private). For prospective entrepreneurs, there are three defining characteristics about the Hermes Masternode that make it optimal for commercializing solutions on the Ambrosus Network.

Characteristic 1: Holistic Off-Chain Data Management

The Hermes Masternode provides enterprises with unparalleled flexibility in how they decide to manage data on the Ambrosus blockchain. More specifically, this means that with the Hermes Masternode data can be segregated as private or public, while all of the data can still be verified for its authenticity: Any private data stored in a local database, can still be shared with select third parties alongside its accompanying blockchain proof.



Additionally, as the ‘abstracted layer’ above the Ambrosus blockchain, Hermes Masternodes are the foundation from which applications can be built using the Ambrosus Software Developer Kits (SDKs), smart contract templates, and rapid deployment IoT kits, without needing to directly interact with the blockchain itself. For entrepreneurs or startups, this vastly expands the pool of developers qualified to build potential solutions, as solutions can be built on AMB-NET in normal programming languages (iOS, Android, JavaScript, etc.). At the same time, for customizing solutions for specific enterprises, the ability to decide which data is public or private is especially commercially appealing.

The complete scope of functions that a Hermes Masternode can perform on the Ambrosus Network can be outlined in the following manner:

1. **Collect and integrate** data from any source in one system (sensors, applications, IT systems) through a universal and battle-tested data model/API.
2. **Process, analyse, validate** incoming data in real-time (check various logic rules, etc.)
3. **Securely Store** all the data created by sensors and other applications with the ability to separate private from public data.
4. **Package** the data & its proofs into Bundles stored on AMB-NET and manage the payments of uploading data to the blockchain.
5. **Share** private data with trusted and authorised third parties (apps, services, etc.)

Characteristic 2: Optimized for the IoT and Existing IT Systems

Second, Hermes Masternodes have been designed to provide a uniform REST API to better facilitate connectivity with existing cloud services, apps, IT Systems, and IoT devices. On a more specific level, the Hermes Masternode receives information from these different IT systems through a universal JSON-RPC model, that structures all data as either an Asset or an Event. The value of building the Hermes data structure around a universal model of Assets and Events (i.e. the Web of Things model) is that it optimizes IoT - Internet - Blockchain interactivity: sensor readings can be easily and directly recorded on the blockchain through an existing cloud infrastructure, while sensitive or client specific information from such devices can be privately managed off-chain.

```

{
  "content": {
    "idData": {
      "assetId": "0xa4db...5fc",           # ID of the asset this event applies to
      "createdBy": "0x853...049",          # Public key of app/sensor/user who created this event
      "accessLevel": 0,                  # Public (0) or private (>0) event
      "timestamp": 1545844724,            # Local time when event was recorded
      "dataHash": "0x8f2...7c5"           # Hash of the data object
    },
    "data": [
      {
        "type": "ambrosus.asset.scanned",
        "name": "Asset was Scanned",
        "scannerId": "2232322324",
        "operator": "John Doe (via iOS APP, vis MES no. 4)",
        "state": "OK",
        "shipped-to": "Belvedere Shop",
        "deliver-by": "20181211@11:00AM"
      }
    ],
    "signature": "0x7fe...71b"           # Hash of idData & data
  },
  "eventId": "0x379...9e5",             # Hash of content
  "metadata": {
    "bundleId": "0x4ab...1b2",          # ID of bundle this event was put in
    "entityUploadTimestamp": 1545844724 # Timestamp Bundle was uploaded to AMB-NET
  }
}

```

Oftentimes such data models are already used within existing Enterprise Resource Planning software (ERPs), or for the labelling of a product according to GS1, GLN, GTIN, SSCC, etc. standards. As such, the Hermes Masternode makes commercial integration of blockchain services more viable for enterprises already using existing software systems, due to the nature of the REST API and JSON-RPC model at its core.

Characteristic 3: Designed to Scale at a Cost-Effective Rate

Third, Hermes Masternodes are exceptional insofar as they are highly cost-effective. Each time an Enterprise Hermes Masternode uploads data onto the Ambrosus blockchain in the form of a bundle the Hermes administrator must pay the equivalent of \$25 USD (in AMB tokens) to the ecosystem via smart contract. Nevertheless, the \$25 USD in Amber, covers the validation and storage of a maximum of 16,384 Assets or Events or 16MB of data packaged into a single bundle.

For entrepreneurs wishing to leverage the Ambrosus blockchain, the cost-effectiveness of Hermes Masternodes provides a high incentive to participate in the ecosystem, as solutions can be designed and serviced at far higher rates than the cost of uploading data onto AMB-NET.

Overall, the Hermes Masternode provides 1) holistic and flexible management of blockchain based data, 2) an efficient and fluid means of communicating with commercial IT systems, IoT Sensors, Apps, and other cloud services, and 3) a cost-effective and scalable model that makes using the Ambrosus Network beneficial for enterprises and entrepreneurs alike.

- Receive and store locally events & assets
- Keep track of all users (accounts) allowed to read/write what information on the system
- Package all Assets/Events into Bundles (16,384 A/E per Bundle)
- Store bundles on AMB-NET for \$25USD in AMB
- Enable public access to Bundles
- Integrate private or public data hashed on the blockchain into dApps