

# The Veego Technology

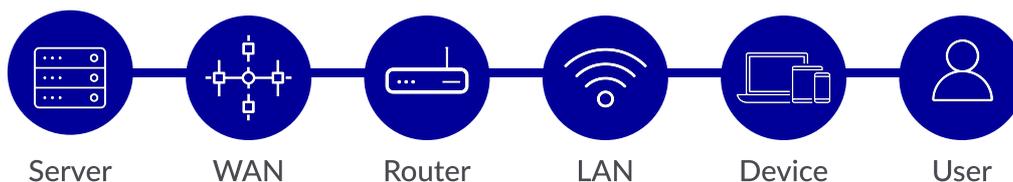
Disrupting the current state of internet service delivery requires a wealth of technological innovations and advancements. Veego has developed and harnessed (and patented) elements of artificial intelligence, pattern analysis, and more to deliver the breakthroughs that are changing the face of ISP subscriber engagement and care.

## The Flow

Veego boosts customer care and engagement processes by inserting AI and other technologies to create and correlate new types of data and automate procedures.

## Visibility

Veego sees end to end, within the home and beyond, continuously discovering the dynamic home-network topology (devices, apps, WiFi, CPE) as well as the “outside” segments (last mile, WAN, cloud service) that participate in the internet service delivery for each session.



## Context

The wide variety of internet subscribers, the mix of devices they use, and the applications they engage with, along with the ever-changing conditions of internet-service delivery within and beyond the home, require a highly personalized approach that reflects each user’s dynamic needs and experience. With so many distinct combinations, “one size fits all” doesn’t work for the internet.

We call it Dynamic Contextual Intelligence (DCI) – Veego’s utterly unique ability to monitor, rate, and perfect each individual user and home’s quality of experience. DCI considers the device being used, the app being consumed, WiFi conditions, router load and capabilities, as well as the current conditions of the last mile, WAN, and even the cloud service wherever it may be located.

Many of our advanced technologies work together to provide DCI:

- **App identification:** Veego identifies each app as it is consumed (without relying on deep-packet inspection). Using advanced traffic and pattern analyses, Veego can tell if an app is streaming, gaming, browsing, etc. and considers the specific requirements for each type.
- **Device fingerprinting:** Veego notices whenever a device connects or disconnects, and discerns its type, properties, and needs. Veego maintains an up-to-date topology of every home network.
- **Network conditions:** Even within the same home, every internet session might travel a different end-to-end path from a distant movie- or game-delivery server through the WiFi coverage and capacity conditions within the home. Veego considers the entire gamut of conditions of each session to fully determine its context.

## Quality of Experience

- **Quality of Experience scoring:** Veego is the only vendor that can accurately assign a score to each running app and to each home in its dynamic context. The QoE score uniquely reflects the actual subjective experience of each user.
- **Continuous monitoring:** The context is dynamic and so is the QoE score. Veego continuously monitors each session and assigns current, accurate QoE scores. Veego utilizes the real-time QoE scoring to autonomously monitor the trend of every session and to determine when to undertake intervention to improve it.

## Problem Detection, Analysis, and Resolution

- **Machine Learning models:** Based on its experience with innumerable device/app/condition combinations, Veego trains machine-learning models that can discern problem types, analyze them, and deliver optimal resolutions.
- **Root-cause analysis:** Based on the QoE score, Veego can promptly determine when a problem situation is occurring (or is about to occur). With its end-to-end visibility, it can pinpoint where the problem is occurring. Using its trained ML models, it can determine the cause of the unacceptable QoE score.
- **Resolution:** The appropriate Veego model can also decide on the effective resolution that not only addresses the problem in its current context but can do so in the context of all the other internet sessions going on at the same time in the same home – fixing one problem should not cause an additional problem either to this user or to another.

Resolution can take one of three forms:

- **Autonomous:** (Veego intervenes automatically and fixes the problem)
  - WiFi glitches constitute less than half of the problems that internet users face. Vendors (including Veego) can usually address them autonomously by adjusting the router/device e.g., through band-steering or channel-switching. Veego addresses numerous other problems beyond the WiFi – that may be due to the device, home-network technology, the last mile, the WAN, or the cloud service.
- **Customer Care:** Collection of all relevant information for presentation to Customer Support Reps via the Veego Care solution for rapid and effective reactive response.
- **Self-Care:** Collection of all relevant information for presentation to the subscriber via the Veego Active mobile self-care app with easy-to-follow instructions for rapid and effective response.

## The Infrastructure

Veego is a SaaS platform that shares breakthrough technologies between its Agent and its Cloud.

### Agent

- Router-resident: The Veego Agent takes its position within the router, the strategic placement between the home network and the WAN, where it provides visibility into every home's internet network and usage as well as across the entire internet service delivery chain. Supported by ML and Veego's cloud-based technologies, the Veego Agent delivers all the capabilities described above.
- Router-agnostic and unobtrusive: The Agent is agnostic to router hardware and runs in a container or in user space. It maintains a very small footprint, is low on memory consumption, and has no impact on CPU processing. Supported by Veego's cloud-based technologies, the Veego Agent delivers all the capabilities described above.
- WAN-aware (last mile): The Veego Agent works on all types of internet connections including fiber, (X)DSL, cable, and 5G.
- Prioritization: The Veego Agent works with a wide variety of router chipsets to enable session prioritization whereby one session (say, a work-related video conference) gains higher priority over another (a game).

5G probe: Drive tests can measure how 5G signals are getting to the home, but, due to penetration difficulties of millimeter wave, drive tests might not reflect the true signal within the home. The Veego Agent provides actual 5G in-home, signal-reception measurements, highly useful for efficient analysis.

# Cloud Analytics

- Over-Time analyses: All usage, performance, behavior data, and other statistics, along with all QoE-related data are generated, captured, and delivered to the cloud for deep analysis. All of the data is anonymized and thus compliant with PII and other data protection regulations.
- Dashboards and reports. From the Veego console, ISP users in a variety of departments can use Veego Analytics to obtain illuminating insights, such as:
  - Marketing: What homes are suffering? Who are the new users who need special onboarding? What are the latest usage trends by geography (or any other attribute of interest)?
  - Engineering: How are various network segments behaving?
  - Customer Care: How much better are we dealing with subscriber support calls thanks to Veego?
  - Customer Success: What proactive initiatives can we take that will improve experience even before problems are encountered?
  - Product: What types of internet devices and service bundles will improve the experience of various segments of users?

Before-and-after measurements: ISP users can analyze experience (or other) data over any period of time for any segment of interest (geography, gamers, etc.). For example, upon undertaking network-segment improvements, users can accurately quantify the effectiveness of their initiatives.

**Veego is the only technology vendor that can deliver actionable subscriber-experience data that reflects the experience the way that subscribers feel it at every moment.**

