

Wi-Fi Calling Gateway

NeatPathNetworks

Neat Path Networks Wi-Fi Calling Gateway implements the 3GPP ePDG standard function necessary for providing Voice over Wi-Fi. 3GPP defines the ePDG as the function connecting an untrusted non-3GPP access to the mobile core. The only use case for it is supporting Wi-Fi Calling. Wi-Fi Calling is a feature that permits mobile operators to offer voice communications when the user is on Wi-Fi and outside reach of the operator's radio using the native dialer of the mobile phone. The most common usage scenario is indoors with poor coverage of the public radio or international roaming. In both cases, the operator can offer its customer the benefits of accessing voice services through the same user interface, with the same features and at the same cost as if they were connected to their 4G/5G radio.

Voice in 4G and 5G relies on 3GPP IP Multimedia Subsystem (IMS). With the ePDG the mobile phone accesses via Wi-Fi the IMS, reaching the same service it would receive on 4G and 5G. Of course, quality of service is not provided over Wi-Fi networks but voice service can be carried out without issues. Neat Path Network Scalable ePDG adapts to any deployment from private premises to public cloud.

Benefits

Solid Performance

Completely built from scratch in Go, its user-space IPsec implementation, paired with a newly designed Diameter stacks, adapting also to smaller network demands, with minimal resource consumption.

Simplified Mode

Provides the minimum features and interfaces to make Wi-Fi Calling work. Reduces the amount of functions required in the network and the complexity of the deployment.

Latest standards

Both simplified and fully standard mode supports Release 18 interfaces integrating with the other EPC functions.

Cloud

Lean applications that shine when deployed in the cloud or in very constrained environments. Whether in public or private cloud, whether AMD or ARM platforms, deployment becomes automatic by using the most standard practices and tools.

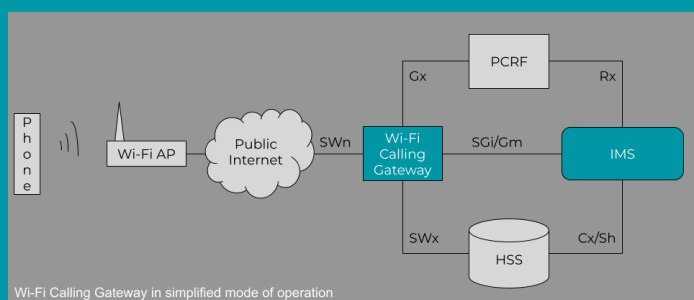
Voice anywhere

With Neat Path's solutions voice and SMS are available on every technology: 4G/5G and Wi-Fi through the native dialer of the phone and via standard integrations

The ePDG is a security function which is deployed in a public IP address reachable from anywhere in the Internet. The mobile phone negotiates an IPsec connection with the ePDG and sends into that IPsec tunnel all the communication towards the IMS/VoWiFi system.

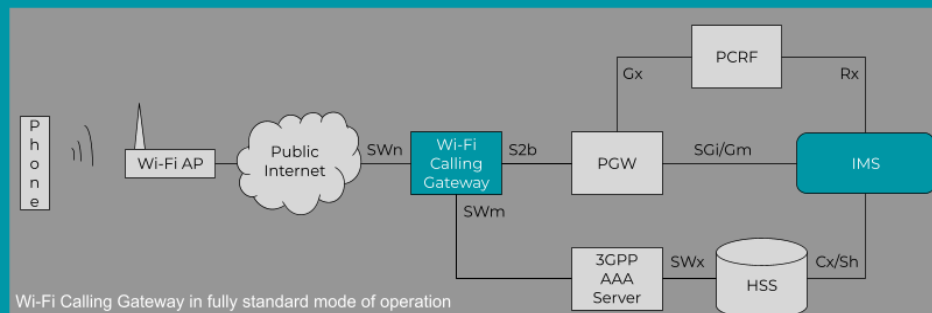
3GPP Standards often include features for all kind of deployments which later do not materialize in reality. Neat Path Network products avoid those standard traps and instead implement solutions to real customer problems. For the ePDG two modes are possible: simplified operations and fully standard compliant.

In the simplified operations mode, after authenticating the UE with its SIM credentials, the Wi-Fi Calling Gateway assigns IP addresses directly to the UEs and connects them to the IMS. In this mode, the Wi-Fi Calling Gateway also interfaces directly with the HSS and acts as an EAP server during the authentication procedure.



The benefits of this mode for the operator are that it does not require additional functions which it may not have (like a 3GPP AAA Server). Since the access through Wi-Fi will only be used for voice calls and the Wi-Fi Calling Gateway authenticates, authorizes and establishes a security association with the phone using its SIM card credentials its a fully secure but operationally simplified option.

The fully standard mode requires more functions in the network but might be preferred for operators which already have them and want all their IMS traffic arriving from the PGW.



Neat Path Networks Wi-Fi Calling Gateway is fully implemented in Go, and it permits containerized deployments and integration with public and private clouds keeping the scalability and manageability of the solution using common paradigms and standard tools both for very large and very small deployments. Testing tools for CI/CD are available to check the full functionality.

Protocols IPv4, IPv6, IKEv2, IPSec ESP, EAP SIP, RTP, RTCP Diameter over SCTP and TCP GTPv2 and GTP-U	Security Algorithms (Rel.19) EAP-AKA, EAP-AKA' DES, 3DES, AES/CAMELLIA-CBC/CTR/CCM, ChaCha20-Poly1305, MD5, SHA, SHA2, GMAC, AES-XCBC, AES-CMAC
3GPP interfaces SWn, SWx, Gx, SGI, SWm, S2b	3GPP Specifications (Release 18) TS 24.302, TS 33.402, TS 23.402, TS 29.273, TS 29.212, TS 29.274
Deployment options AWS, Google Cloud, Azure OpenStack, Docker, VMWare, OpenShift, any Kubernetes, any Linux	Other Specifications RFC 3748, RFC 4187, RFC 5448, etc RFC 7296, RFC7634, RFC 5529, RFC 4868, RFC 4543, RFC 4309, RFC 4304, RFC 4303, RFC 4106, RFC 3948, RFC 3602, RFC 2404, RFC 2403
Observability Prometheus & Grafana	Use Cases VoWiFi for Private Networks, MVNOs, MNOs

Neat Path Networks Scalable Voice core

The Wi-Fi Calling Gateway complements Neat Path Networks' Scalable Voice Core which is a complete implementation of the IP Multimedia Subsystem for VoWiFi/VoLTE/VoNR available for operators. Scalability and security have been at the forefront of the design fitting from small private networks that need to provide voice services to large operators that are renewing their existing IMS.

Deployable in the public and private cloud with integration with standard cloud tools and following current best-practices in a fresh new implementation of an existing standard that provides exactly the features which are needed to provide the service without the bloating of non relevant features.

About Neat Path Networks GmbH

Neat Path Networks (NPN) delivers new software solutions for telecommunications based on the latest software development paradigms and tooling. The vision is to remove complexity bringing solutions to customers of all sizes and which often go beyond what is available in the market and with the actually required features that never appear in the standards.

Founded in Berlin in 2024, the NPN founding team builds on the experience of having created an Open Source IMS implementation in 2004 (which is the roots of the most popular Open Source IMS) and a closed-source implementation of the EPC which is used in production by various companies today.

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