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|  | **Stateful VNF** | **Stateless VNF** |
| **Introduction** | Stateful and Stateless are two terms that are commonly describing the capability of the system/program to either store state of a certain interaction/session (Stateful) or not keeping any information at all (Stateless).  It is commonly used in many domains such as packet inspection (Firewall), Protocols, Virtual Machines (VNFs), etc.  UDP is an example of "Stateless" protocol where both sender and receiver don't keep information about the session. While TCP is an example of "Stateful" protocol. | |
| **Definition** | The term "Stateful VNF" describes a VNF whose its internal architecture is built based on VNF Components (Virtual Machines) that are stateful by nature. | The term "Stateless VNF" describes a VNF whose its internal architecture is built based on VNF Components (Virtual Machines) that are stateless by nature. |
| **Examples** | Let's assume that VNF vPGW (Virtual PDN Gateway) is a stateful VNF that includes Stateful VMs doing the processing of Control plane and User plane.  This implies that session information is stored in the VM itself.  If one VM is lost, the subscribers sessions are lost so users have to reconnect again to establish a session.  To avoid such scenario, many stateful VNFs are using legacy ways of redundancy (2N, N+1, etc) which can be seen as a waste of resources having standby VMs. | For the other case if VNF vPGW is a stateless VNF that includes Stateless VMs doing the processing of Control plane and User plane.  This implies that the session info is not stored in the VM itself.  Normally there is a Shared Database layer that stores the state (Session Info).  If one VM is lost, the subscribers sessions are not lost so another processing VM can interrogate the Shared Database layer to get the session info and resume the session for the users without being disconnected and without the need to have any redundancy technique on the processing VM level. |
| **Note** | the Stateful VNF are thought to be a direct mapping of the Physical Network Function (PNF) architecture to the Virtual architecture. | This is the recommended VNF Architecture that is commonly seen as a step towards a cloud Native app. and there are white papers that link such architecture with 5G ready VNFs. |