**Control Planes and Data Planes**

**1. Control Plane:**

In Routing control plane refers to the all functions and processes that determine which path to use to send the packet or frame. Control plane is responsible for populating the routing table, drawing network topology, forwarding table and hence enabling the data plane functions. Means here the router makes its decision. In a single line it can be said that it is responsible for How packets should be forwarded.

**2. Data Plane:**

In Routing data plane refers to all the functions and processes that forward packets/frames from one interface to another based on control plane logic. Routing table, forwarding table and the routing logic constitute the data plane function. Data plane packet goes through the router and incoming and outgoing of frames are done based on control plane logic. Means in single line it can be said that it is responsible for moving packets from source to destination. It is also called as Forwarding plane.

**Difference between Control Plane and Data Plane :**

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| **S.No.** | **CONTROL PLANE** | **DATA PLANE** |
| 01. | Control plane refers to the all functions and processes that determine which path to use to send the packet or frame. | Data plane refers to all the functions and processes that forward packets/frames from one interface to another based on control plane logic. |
| 02. | It is responsible for building and maintaining the IP routing table. | It is responsible for forwarding actual IP packet. |
| 03. | Control plane responsible about how packets should be forwarded. | Data plane responsible for moving packets from source to destination. |
| 04. | Control plane performs its task independently. | Data plane performs its task depending on Control plane. |
| 05. | In general we can say in control plane it is learned what and how it can be done. | In general we can say in data plane the actual task is performed based on what is learned. |
| 06. | Control plane packets are processed by router to update the routing table. | The forwarding plane/data plane forwards the packets based on the built logic of control plane. |
| 07. | It includes [Spanning Tree Protocol (STP)](https://www.geeksforgeeks.org/types-of-spanning-tree-protocol-stp/), [Address Resolution Protocol (ARP)](https://www.geeksforgeeks.org/how-address-resolution-protocol-arp-works/), [Routing Information Protocol (RIP)](https://www.geeksforgeeks.org/routing-information-protocol-rip/), [Dynamic Host Configuration Protocol (DHCP)](https://www.geeksforgeeks.org/dynamic-host-configuration-protocol-dhcp/) etc. | It includes decrementing Time To Live (TTL), recomputing [IP header checksum](https://www.geeksforgeeks.org/calculation-of-tcp-checksum/) etc. |
| 08. | Control plane packets are locally originated by the router itself. | Data plane packets go through the router. |
| 09. | Control plane acts as a decision maker in data forwarding. | Data plane acts as a decision implementer in data forwarding. |
| 10. | Routing is performed in the control plane. | Switching is performed in the data plane. |

AWS separates most services into the concepts of *control plane* and *data plane*. These terms come from the world of networking, specifically routers. The router’s data plane, which is its main functionality, is moving packets around based on rules. But the routing policies have to be created and distributed from somewhere, and that’s where the control plane comes in.

Control planes provide the administrative APIs used to create, read/describe, update, delete, and list (CRUDL) resources. For example, the following are all control plane actions: launching a new [Amazon Elastic Compute Cloud](http://aws.amazon.com/ec2/) (Amazon EC2) instance, creating an [Amazon Simple Storage Service](http://aws.amazon.com/s3/) (Amazon S3) bucket, and describing an [Amazon Simple Queue Service](http://aws.amazon.com/sqs/) (Amazon SQS) queue. When you launch an EC2 instance, the control plane has to perform multiple tasks like finding a physical host with capacity, allocating the network interface(s), preparing an [Amazon Elastic Block Store](http://aws.amazon.com/ebs/) (Amazon EBS) volume, generating IAM credentials, adding the Security Group rules, and more. Control planes tend to be complicated orchestration and aggregation systems.

The data plane is what provides the primary function of the service. For example, the following are all parts of the data plane for each of the services involved: the running EC2 instance itself, reading and writing to an EBS volume, getting and putting objects in an S3 bucket, and Route 53 answering DNS queries and performing health checks.

Data planes are intentionally less complicated, with fewer moving parts compared to control planes, which usually implement a complex system of workflows, business logic, and databases. This makes failure events statistically less likely to occur in the data plane versus the control plane. While both the data and control plane contribute to the overall operation and success of the service, AWS considers them to be distinct components. This separation has both performance and availability benefits.