### **AWS VPC IP Exhaustion Mitigation SOP**

##### Objective:

##### To systematically address IP exhaustion within an AWS VPC by analyzing, optimizing, and potentially restructuring the IP address space to ensure scalability and availability.

##### **Pre-requisites:**

##### AWS account credentials with the necessary permissions for VPC management.

##### Access to the AWS Management Console or AWS CLI.

##### Collaboration with application owners and stakeholders.

##### **Steps:**

##### **Step 1: Current IP Address Usage Assessment**

##### 1.1. Access the AWS Management Console or use the AWS CLI to navigate to the VPC Dashboard.

##### 1.2. Review the current IP address usage within the VPC:

##### Identify the VPC CIDR block.

##### List all subnets along with their CIDR blocks.

##### Examine the utilization of Elastic IPs (EIPs).

##### Identify any existing VPC peering connections.

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##### **Step 2: Future Resource Requirements Analysis**

##### 2.1. Collaborate with application owners and stakeholders to understand future resource requirements:

##### Document anticipated increases in EC2 instances, load balancers, and other resources.

##### Consider any upcoming changes in network architecture or application deployments.

##### 2.2. Evaluate the impact of resource growth on the existing IP address space.

##### **Step 3: Subnet Design Review**

##### 3.1. Assess the existing subnet design:

##### Analyze subnet sizes and available IP addresses.

##### Identify subnets with limited available IP addresses.

##### 3.2. Consider whether the current subnet design aligns with anticipated growth.

##### **Step 4: Elastic IP Optimization**

##### 4.1. Identify and review the usage of Elastic IPs within the VPC:

##### List all associated EC2 instances using Elastic IPs.

##### Verify the necessity of each Elastic IP.

##### 4.2. Release any unused or unnecessary Elastic IPs.

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##### **Step 5: Unused Resources Identification**

##### 5.1. Identify and terminate any unused or underutilized resources within the VPC:

##### List EC2 instances, network interfaces, and elastic load balancers that are not actively utilized.

##### Collaborate with relevant teams to confirm resource status before termination.

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##### **Step 6: Reserved Instances Consideration**

##### 6.1. Evaluate the option of using Reserved Instances:

##### Assess cost savings and benefits.

##### Consider Reserved Instances for instances with stable usage patterns.

##### **Step 7: Subnet CIDR Block Modification**

##### 7.1. If necessary, modify the CIDR blocks of existing subnets:

##### Evaluate the impact on routing and network connectivity.

##### Plan for a maintenance window and notify stakeholders.

##### 7.2. Execute the CIDR block modifications and update route tables accordingly.

##### **Step 8: VPC Peering Implementation**

##### 8.1. Consider VPC peering to facilitate communication between resources in different VPCs:

##### Assess security and routing requirements.

##### Establish VPC peering connections as needed.

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##### **Step 9: VPC Migration Planning**

##### 9.1. If the existing VPC design is not scalable, plan for a VPC migration:

##### Collaborate with stakeholders to define a migration plan.

##### Schedule a maintenance window and communicate the migration schedule to all relevant parties.

##### 9.2. Execute the VPC migration plan, ensuring minimal impact on running applications.

##### **Step 10: Monitoring and Periodic Review**

##### 10.1. Set up CloudWatch alarms to monitor IP address utilization within the VPC.

##### 10.2. Conduct periodic reviews of IP address usage and adjust configurations as needed.

##### **Step 11: Documentation of Changes**

##### 11.1. Document all changes made to the VPC configuration:

##### Maintain a record of subnet configurations, IP allocations, and any modifications.

##### **Step 12: Communication of Changes**

##### 12.1. Communicate any changes to relevant stakeholders:

##### Provide detailed information on modifications made to the VPC.

##### Ensure that all team members are aware of the changes and their potential impact.

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##### **Conclusion:**

##### This comprehensive SOP ensures a thorough examination of the current state, consideration of future requirements, and the implementation of appropriate measures to address IP exhaustion within the AWS VPC. Regular reviews and documentation will help maintain a scalable and efficient IP address management strategy. Adjust the SOP as needed to align with specific organizational requirements and changes in the AWS environment.