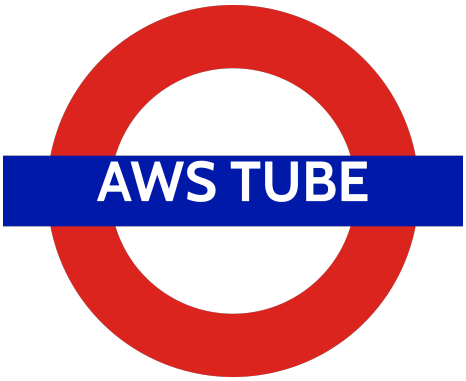

Figure 1: CLICK HERE TO RETURN TO STATION

Recovery Sheet 3

SJ Green

Recovering from the session delivered on the night of **Wednesday 29th Janurary 2025**. In the last session, we looked at securing the AWS Account. You can view the recovery sheet for that week here. This week we begin looking at networking on AWS, which is a technical and difficult topic. We are going to take two weeks on this, because there is so much to cover. Once you feel you have mastered this sheet, start preparing with Recovery Sheet 4

1 Active-Active

Description

1. An **IP Address** is a numerical label such as 192.0.2.1 that is assigned to a device connected to a computer network that uses the Internet Protocol for communication. Jon Postel writes: "The internet protocol provides for transmitting blocks of data called datagrams from sources to destinations, where sources and destinations are hosts identified by fixed length addresses. The internet protocol also provides for fragmentation and reassembly of long datagrams, if necessary, for transmission through "small packet" networks. [Postel 1980]

2. **The OSI Reference Model** In the 1970s, networking was either largely government sponsored or vendor developed. For example, there was the

National Physical Laboratory in the UK and ARPANET in the USA. Examples of vendors who had networks include Digital Equipment corporation and their DECnet, as well as IBM and their Sysems Network Architecture. Eventually, public networks started to emerge, and there needed to be standardisation.

A publication from the National Computing Centre in the UK, entitled *Why Distributed Computing*, made the case for standardisation. The UK presented its findings at a meeting of the OSI in Sydney. Universities in the UK developed prototypes of the standards [Campbell-Kelly 2013]. The first standard was published by the ISO in 1980.

OSI stands for Open Systems Interconnection. It has seven layers. Layer 1 is the Physical Layer. Layer 2 is the Data link layer. Layer 3 is the Network layer. Layer 4 is the Transport Layer (think about reliable tables with four legs, and reliable trains, running according to their timetable, as an aid to remembering this). Layer 5 is the Session layer (think about basketball players exchanging high-fives, after a great session, as an aid to remembering this). Layer 6 is the Presentation layer. Layer 8 is the Application Layer. All seven layers can be easily remembered.

3. **Routing** is the process of selecting a path for traffic in a network or across multiple networks [Wikipedia].

   When people say "routing", they often are referring specifically to IP routing. The Internet Protocol (IP) operates at Layer 3 of the OSI model.

4. **Classless Inter-domain Routing (CIDR)** The term "inter-domain" just means "between domains". So, we are talking about routing packets between domains in a certain way.

   It used to be the case that *classes* were used. Every address was contained in a network and the network was either Class A or Class B or Class C. Understand that an address must denote both the network (group of devices) and the specific device itself. It has 32 bit positions to achieve both these things. Usually, the network denotation task is performed with the *first* bit positions, so it is called a network *pre*fix. With classes, things were kept **rigid and fixed**: Class A networks used the first 8 bit positions to denote the network; Class C networks used the first 16 bit positions; and Class C networks used 24 bit positions for denoting the network. (Think of C as "see": having so many bit positions for network identification, it was very perceptive.) Recall that we have 32 bit positions to play with. Any of the 32 bit positions which were not used for network denotation, often called network identification, could be used for host identification. This is the task of identifying particular hosts on the network. Now, when

we switch to class*less*, we are no longer rigid and fixed in this way. We are no longer rigid and fixed with how many bit positions are used for network identification and how many bit positions are used for host identification. We are freed up to use, perhaps 10 bit positions for network identification. We no longer are constrained to only ever using 8 or 16 or 24 bit positions for network identification. This is why it is known as *classless* inter-domain routing.

5. **VPC** This entity is, effectively, your network on AWS. Launched by AWS in 2009, it was a response to companies that were making their own private clouds. This was *virtually* a private cloud, since it is held in AWS data centres.

   "We have developed Amazon Virtual Private Cloud (Amazon VPC) to allow our customers to seamlessly extend their IT infrastructure into the cloud while maintaining the levels of isolation required for their enterprise management tools to do their work" wrote Vogels in 2009.

   A VPC has a particular CIDR range. For example, 10.0.0.1/16. This is the chief way we identify the VPC. Supposing the VPC a network can help to understand why portions of it are denoted sub-networks, or *subnets*. The User Guide states: "With Amazon Virtual Private Cloud (Amazon VPC), you can launch AWS resources in a logically isolated virtual network that you've defined. This virtual network resembles a traditional network that you'd operate in your own data centre, with the benefits of using the scalable infrastructure of AWS".

6. **Subnet** Description
7. **IPv6 Address** Description
8. **Route table** Description
9. **CIDR Block** Description
10. **Firewall** Description

2 Warm Standby

3 Pilot Light

The pilot comes aboard ships in unfamiliar waters to sort out shit.

1. **IP Address**
2. **The OSI Reference Model** Description
3. **Routing** Description.

4. **Classless Inter-domain Routing (CIDR)** The Internet Engineering Taskforce introduced CIDR in 1993 [Wikipedia].
5. **VPC** Description
6. **Subnet** Description
7. **IPv6 Address** Description
8. **Route table** Description
9. **CIDR Block** Description
10. **Firewall** Description

4 Backup

1. **IP Address**
2. **The OSI Reference Model** Description
3. **Routing** Description.
4. **Classless Inter-domain Routing (CIDR)** Description.
5. **VPC** Description
6. **Subnet** Description
7. **IPv6 Address** Description
8. **Route table** Description
9. **CIDR Block** Description
10. **Firewall** Description