SOME BORING NETWORK ENGINEERING INTERVIEW QUESTIONS

AND HOW TO REPLACE THEM WITH SMARTER CHOICES

KAM AGAHIAN

DIRECTOR, NETWORK INFRASTRUCTURE- UNIVERSITY OF SOUTHERN CALIFORNIA (USC)

CCIE#25341 X2

NE INTERVIEWS

- We will cover
  - Fundamentals of network engineering interview topics
  - The overlooked criteria
  - Examples of what you don't want to ask/be-asked
    - Smarter choices and how they help?

THE PILLARS OF BEING A TRADITIONAL NE

- **TCP/UDP/IP**
- **IGP**
- **BGP**
- **Other areas of expertise:** MPLS – Data Center – Automation
  - Voice, Security, Systems (e.g. Linux) – a little bit untraditional

(THE) GREAT EXPECTATIONS

- **TCP/UDP/IP**
  - **TCP, UDP and IP headers and how they're used?**
  - **TCP session establishment and ending process**
  - **TCP congestion control mechanism and slow start process**
  - **TCP/UDP advantages and disadvantages**
  - **Perhaps some higher layer troubleshooting tools such as trace route**

(THE) GREAT EXPECTATIONS

- **IGP of choice**
  - **OSPF**
    - **OSPF theories and messaging model**
    - **Single and multi area designs and challenges**
    - **LSA types (perhaps v4 vs v6), interface types, timers**
    - **Filtering, summarization and optimization**
  - **ISIS**
    - **ISIS theories and messaging model**
    - **Single and multi area designs and challenges**
    - **LSP types, reasons behind TLV types and metric challenges**
    - **Single and multi topology and IPv6 interactions**
    - **Filtering, summarization and optimization**

(THE) GREAT EXPECTATIONS

- **BGP – Sometimes depends on the line of business**
  - **BGP**
    - **Why BGP?**
    - **BGP theories including the state machine and messaging**
    - **BGP attributes and how they help in various scenarios such as traffic manipulation**
    - **Summarization, filtering and optimization (e.g. "newer" methods such as PIC, 4B ASN)**
    - **Global BGP and its challenges**
    - **BGP in enterprises and its challenges**
    - **BGP in data center designs and its challenges**
    - **BGP in carriers and its challenges**

NE INTERVIEWS…

- Were traditionally designed to measure candidates' technical depth
  - Barely covers only one aspect of being a successful NE

- Inception of the boring questions…

WHAT WE TEND TO OVERLOOK

- Room for proper leveling
  - To have flexibility to hire at a lower or higher levels
  - To make sure the candidate is at the level you are hiring
  - To be able to compare two good candidates

WHAT WE TEND TO OVERLOOK

- Room for candidates' creativity
  - To give room to candidates to imagine, design and build
  - To gauge candidates' willingness and passion to even engage in discussions
  - To measure candidates' thought process beyond cold hard technical solutions

SAMPLE QUESTIONS

- Ready to explore some of the topics?

TCP/UDP/IP

- What is the difference between TCP and UDP?

TCP/UDP/IP

- What are the differences between TCP and UDP?
  - **Intention**: Mostly whether the candidate is familiar with reliability at layer 4.

TCP/UDP/IP

- What are the differences between TCP and UDP?
  - **Major issues**:
    - Interviewers tend to break off the chase after hearing the word "reliable" or "ACK" or "Handshake"
    - Can be superficially memorized without deep understanding
    - No room for creativity or leveling (i.e. it's flat)

TCP/UDP/IP – THE PLANE SCENARIO

- Let's design a fictious aviation tracking system
  - We want our fleet of planes to report their locations and other vital parameters once every 5 minutes. Let's say we had a choice to use TCP or UDP which one would you pick and why?

TCP/UDP/IP – THE PLANE SCENARIO

- The plane scenario
  - The candidate needs to:
    - To understand stakes, risks and definition of success
    - To evaluate options: Reliability vs Simplicity
    - To articulate reasoning
    - To defend ideas (bonus point: soft skills)
    - Perhaps expose various hidden layers in their design (e.g. cost, other options etc.)

IGP

- What are the differences between OSPF and ISIS?

IGP

- What are the differences between OSPF and ISIS? Or Which one do you like better?!
  - **Intention**: Whether the candidate has <u>any</u> experience with both protocols – maybe?

IGP

- What are the differences between OSPF and ISIS?
  - **Major issues**:
    - The two protocols very few similarities!
      - Messaging, leveling, timers, applications, traffic engineering, design considerations and many more are all different. But they're both Link State!
    - Can be superficially memorized without deep understanding
    - No room for creativity or leveling (i.e. it's flat)

IGP

- Hidden risk:
  - Biased interviewing
    - The candidate can name 10 differences without hitting THE difference that the interviewer has in mind. They are all correct but still not the correct answer.
    - Then follows a series of hints which later during the debrief will be perceived and described as “hand holding”.

IGP – THE EXPERIMENTAL ROUTING SCENARIO

- Let's be creative for a bit and design a fictious routing protocol
  - We have limited time and resources available and need to create a link state protocol to support an experimental type of IP. Would start you work based off OSPF or ISIS and why?

IGP - THE EXPERIMENTAL ROUTING SCENARIO

- The Experimental Routing Protocol scenario
  - The candidate needs to:
    - To understand the limitations
    - To identify the key to success: Fewest number of changes
    - To articulate reasons
    - Perhaps expose various hidden layers in their design (the IPv6 experience, phases, other options etc.)
      - Maybe they can challenge the interviewer's imitations by going after BGP and optimizing it.

BGP

- Case 1: Explain the BGP decision process
  - **Intention**: Whether the candidate is aware of the steps in the right order.

BGP

- Case 1: Explain the BGP decision process
  - **Major issues**:
    - More of a memory test
    - No room for creativity or leveling (i.e. it's flat)

BGP

- Case 2: Which one is well known, optional, mandatory, discretionary etc.?
  - **Major issues**:
    - More of a memory test
    - No room for creativity or leveling (i.e. it's flat)

BGP – THE EGB DEVELOPMENT CASE

- With limited time and resources you are developing an open source experimental version of BGP.

What BGP attributes would you develop in the first phase? And why?

BGP - THE EGB DEVELOPMENT CASE

- Experimental EGP
  - The candidate needs to:
    - Understand the concept of well-known and mandatory attributes
    - Know what attributes are well-known and mandatory
    - Understand BGP beyond simple lab setups
    - Understand the risks and be able to articulate an example

BGP

- Case 3: How do you influence inbound (or outbound) traffic:
  - **Intention**: Whether the candidate can apply the BGP attributes to a semi-real world scenario.

BGP

- Case 3: How do you influence inbound (or outbound) traffic.
  - **Major issues**:
    - Very classic answers that can be memorized in minutes
    - No room for creativity or leveling (i.e. it's flat)

BGP– THE MED/AS-PATH SCENARIO

- In order to influence inbound Internet traffic into the network a network engineer is proposing use of the MED.

What is the point she is missing?

BGP

- The MED/AS-PATH scenario
  - The candidate needs to:
    - To understand limitations and definition of success
    - Know how the MED works; a lot of details to understand
    - Know why the transitive and non-transitive attributes exist
    - Know why the well-known mandatory attributes exist
    - Understand BGP beyond simple lab setups.
    - Understand the risks and be able to articulate an example

BGP

- The MED/AS-PATH scenario
  - Also leaves room for further layers and thinking outside the box:
    - What if due to lack of expertise we prefer not to mess with BGP attributes?
      - Advertise more specific prefixes
      - Do not advertise

Q/A