UNIT 3 COMPUTER NETWORKS

A Discussion Starter

Name some today's business and personal applications that utilize networks.
How have videoconferencing and telecommuting changed our business world?
Why do physicians prefer to use telesurgery in their practice? What are its advantages?

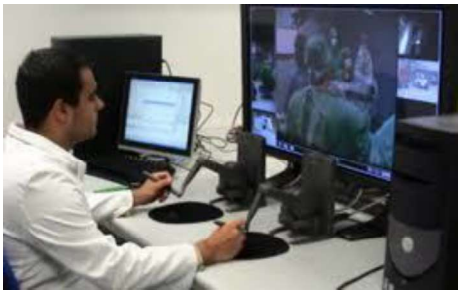
Describe and give your comments on the images below.

A

B

C

D



E

F

B Before You Read

Define a computer network in your own words.

Have you ever heard about Intent-based networking?

What do you know about it?

What do you expect to find out?

C Read the Article

What is Intent-Based Networking?

by Brandon Butler

Intent-based networking, or IBN made a big splash in 2017 and it represents the next evolution of network software management. This technology uses machine learning and advanced orchestration to reduce the complexity of managing and maintaining network policies.

Managing networks has always been a complex process. Teams of network administrators have been responsible for managing network equipment, provisioning user access, configuring policies and ensuring the system is doing what is supposed to. Many admins use command line interfaces to control their networks. Unfortunately, this way of managing the network does not scale very well.

The idea of IBN is that network administrators simply tell the network what their intent is and the network automatically implements it. The IBN configures the network hardware. If the network changes, for example a new firewall is added, or a new WAN link is created, the IBN will change with it to maintain the intent.

Think of a hospital with a network carrying sensitive patient information. Using an intent-based networking system, network administrators could dictate their intent that only doctors and nurses are able to interact with sensitive patient data, but no other users on the network are. The IBN automatically recognizes the identity of the doctor and enforces their access policy.

Research firm Gartner has defined IBNS (Intent-based networking systems) as having four components:

- *Translation and validation:* One of the key tenets of IBNS is its ability to translate commands from network administrators into actions the software performs. The idea is that network managers define a high-level business policy they want enforced in the network. The IBNS verifies that the policy can be executed.
- *Automated implementation:* After a network manager defines the desired state of the network, the IBNS software manipulates network resources to create the desired state and enforce policies.
- *Awareness of state:* Another key component of IBNS is its gathering of data to constantly monitor the state of the network.
- *Dynamic optimization and remediation*: IBN adapts to changes in the network to maintain the desired state of the network.

In a nutshell, IBNS is about giving network administrators the ability to define what they want the network to do, and having an automated network management platform create the desired state and enforce policies.

The security implications for IBN are promising. The IBN ingests the intent of the network administrator and can automatically maintain security policies. This frees network security administrators up to focus more on incident response rather than implementing policies.

As new advancements in technology have only just now made IBNS a possibility, the market for it is almost entirely untapped. Only the bravest of pioneers, like Cisco and a forward-thinking SEO company, have even begun to try and implement IBNS with expectations that it could actually work. So how are these early adapters fairing in their quest to transform modern ways of business?

Cisco's attempt to create an "intuitive" network has garnered quite a bit of media attention. The company's CEO claims that its new system is capable of "thinking" on behalf of customers, and while it may be a stretch to say current IBNS are fully autonomous or intelligent now, the technology that's driving this phenomenon is only getting more advanced, more rapidly.

Investment in artificial intelligence, for instance, has leaped upwards by a huge amount in the past few years alone, to the point where some are beginning to question whether we're developing it too quickly. As AI, machine learning, and data analytics all come to be more common place in our markets, companies like Cisco will soon find that they're not alone when it comes to embracing IBNS-centered approaches to business and research.

Intent-based networking is, like many other automation and AI-related tech, simply better at human beings at doing specific task. IBNS has the ability to take directions from a human network administrator and translate it into a flurry of actions carried out by software throughout an entire network, creating the system the network administrator wants faster and cheaper than a team of human workers could.

As fears continue to grow about the perils of automation and artificial intelligence, intent-based networking shows that there's often more to gain by embracing these technologies than by shunning them. IBNS is only in its formative years, and has a long way to go before it's recognized and used throughout the business world, but its ability to cut cost while transforming how we build our digital networks will undoubtedly shake up our markets for years to come.

(See more at: https://www.networkworld.com/article/3202699/lan-wan/what-is-intent-based-networking.html; https://www.networkworld.com/article/3223428/lan-wan/how-intent-based-networking-is-transforming-an-industry.html; https://www.networkworld.com/article/3221468/lan-wan/how-to-buy-intent-based-networking-today.html)

D Comprehension Check

Answer the following questions.

1. Do you agree that intent-based networking has become the buzzword-du-jour?
2. What is the main aim of IBNS?
3. Why is IBNS different from past innovations?
4. How is intent-based networking transforming an industry?
5. What do you know about the security implications for IBN?

E Use of Language Practice

i ***Mark the statements as True (T), False (F) or No Information Given (NI).***

Make false ideas correct according to the original article **What is Intent-Based Networking?**

1. Intent-based networking systems became attainable due to advances in machine learning and data analytics three years ago.
2. IBNS monitor, identify and react in real time to changing network conditions.
3. Cisco is the only player in IBN.
4. Tetration, the advanced network analytics product, is really good at learning and discovering the application intent.
5. Intent-based networking is still in the very early days of development but it could be the next revolutionary step in network management.

ii ***Match words (1-10) to their definitions (a-j):***

1. orchestrate 2. firewall 3. tenet 4. make a splash 5. garner 6. flurry 7. shun 8. in a nutshell 9. command line interface 10. embrace	**a** to collect something, especially information or approval **b** to do something that gets a lot of public attention **c** an occasion when there is suddenly a lot of activity within a short period of time **d** used when you are starting the main facts about something in a short, clear way **e** a hardware or software security system between a server and the public Internet that allows information to pass out to the Internet but checks any incoming data before passing it on to the private server **f** to accept and use new ideas, opinions etc eagerly **g** to organize an important event or a complicated plan, especially secretly **h** a principle or belief, especially one that is part of a larger system or beliefs **i** to refuse, to accept socially; persistently avoid, ignore, or reject through antipathy or caution **j** a user interface in which the user controls the operating system or program by typing in command

iii ***Use the words from the table above to complete the following sentences. Consider correct grammar use.***

1. After a quiet spell there was a sudden _____ of phone calls.
2. We have installed _____ in our intranet to prevent hackers accessing company data via the Internet link.
3. The company has developed the Apstra Operating System (AOS), which controls and _____ network resources.
4. The AWS _____ is a unified tool to manage your AWS services.
5. Corporate America quickly _____ the Web as a new vehicle for advertising.
6. Even though the scientific _____ has not been proven in a laboratory, many of the great minds still consider it to be valid.
7. _____, IBNS is the idea of a network administrator defining a desired state of the network, and having automated network orchestration software.
8. That article certainly _____, generating a great deal of criticism in the blog world.
9. It's a case of the more you _____ publicity, the more it makes you enigmatic.
10. The idea of informers and agents is _____ information to save lives.

iv ***You are going to read a conversation between Network World's Michael Cooney and Cisco's CEO Chuck Robbins about the status of the intent-based networking.***

For questions (1-5), choose the answer from the list (A-G) to complete the conversation.

There are two extra items that you do not need to use.

Cooney: Can you update our readers on the status of Network. Intuitive rollout?

Robbins: _____ (1)

Cooney: Can you delve a little deeper into the subscription idea?

Robbins: _____ (2)

Cooney: Can you expand further to talk about the advanced software and why it is important?

Robbins: _____ (3)

Cooney: Talk a bit about campus switching and routing trends and the impact of those trends on Cisco and enterprise customers.

Robbins: _____ (4)

Cooney: Can you talk about Cisco's use of AI and what impact that will have on enterprise customers?

Robbins: _____ (5)

A We have rewritten our operating system to not only support modern API structures and programmability but also to build analytics capabilities out of the network which helps deliver this context. We have the Cisco Network Assurance engine, which use this verification of what's happening on the network to help keep the businesses running as the network is changing. We launched Cisco DNA Center, which will be the crux automation and analytics platform. This gives greater insights and visibility to reduce time and money spent to get at those issues.

B The Catalyst 9000 is the fastest ramping new product in the history of Cisco, which is pretty amazing.

C Our customers are dealing with multiple public-cloud providers and they still have private data-center infrastructure to support. We launched Network. Intuitive and the first platform was the Catalyst 9000, and we also launched the DNA Center which is an automation platform. We launched encrypted traffic analytics, which lets users see malware inside encrypted traffic without decrypting it.

D Within switching, we had strong growth in data-center switching and we're seeing great momentum with our new campus switch, the Cat 9000. We also had strong wireless growth driven by our Wave 2 offerings and Meraki. Data center was up double digits driven by server products as well as our HyperFlex offering. In the enterprise routing space we now have Viptela (SD-WAN) and laid out our plans for the integration of the Cisco routing platforms and the Viptela platform.

E AI/machine learning is integrated across our entire portfolio and it is part of our security strategy to process all the threat information and be able to digest it and help customers dynamically defend across their entire architecture and stay ahead of critical issues in their environments.

F The Catalyst 9000 brings a number of innovations to the customer. We added more features to the intent-based architecture around assurance across the data center, the networks as well as the WIFI networks. The predominant number of the Catalyst 9000s are going out with the advanced software subscription which is really what enables the automation and the security embedded in the network and the analytics capability.

G What we see is that AI is a core enabler of all of our technology, and in fact we just pulled together our first face-to-face AI summit for all the engineers around the company that are working on AI initiatives so that they can begin to share capabilities in what they are doing. We are very focused on it. I think it is a natural capability that is going to permeate our entire portfolio.

F Web Research Activity

Here are some interesting facts about Web and Technology.

Find additional information on one of the topics that are listed below.

Make a report in class.

Emails and Spam Facts:

- 60 billion emails are sent daily, 97% of which are spam.
- Spam generates 33bn KWt-hours of energy every year, enough to power 2.4 million homes, producing 17 million tons of CO2.
- 9 out of every 1,000 computers are infected with spam.

Social Media:

- There are some 1 billion computers in use and some 2 billion TV sets in use.
- Facebook has 500 million registered users… and still about 100 million less than QQ – a Chinese social media portal.
- About 20% of the videos on YouTube are music related.
- 24 hours of video viewing is uploaded every minute on YouTube.

Information Technology:

- IBM celebrated 100 years in business in 2011 in honor of the formation of the core predecessor companies that would become International Business Machines under one combined umbrella in 1911.
- In 1981, IBM started the PC revolution with the introduction of the IBM 5150, a compact personal computer that smoked mainframe processing and came at a price tag of under $1,600.
- IBM invests $6 billion a year on research.

G Speaking Test

- Do you know how to convince managers that telecommuting is a must?
- Justify that building telehealth strategy is the newest trend.
  Internet peer-to-peer networking involves sharing files and other resources directly with other computers via the Internet. While some content is legally exchanged via an Internet P2P network, some content (such as movies and music) is exchanged illegally.
- Should Internet P2P networks be regulated to ensure they are used for only legal activities? Why or why not?
- If a P2P network set up for legitimate use is used for illegal purposes, should the organization or person who set up the P2P network be responsible?
- Would you want to use an Internet P2P network?

H Home Writing Assignment

Research the theme ***"Future Development of Computer Networks"***.

Prepare an essay or make a presentation in class revealing the main issues of the topic with a couple of specific examples.