



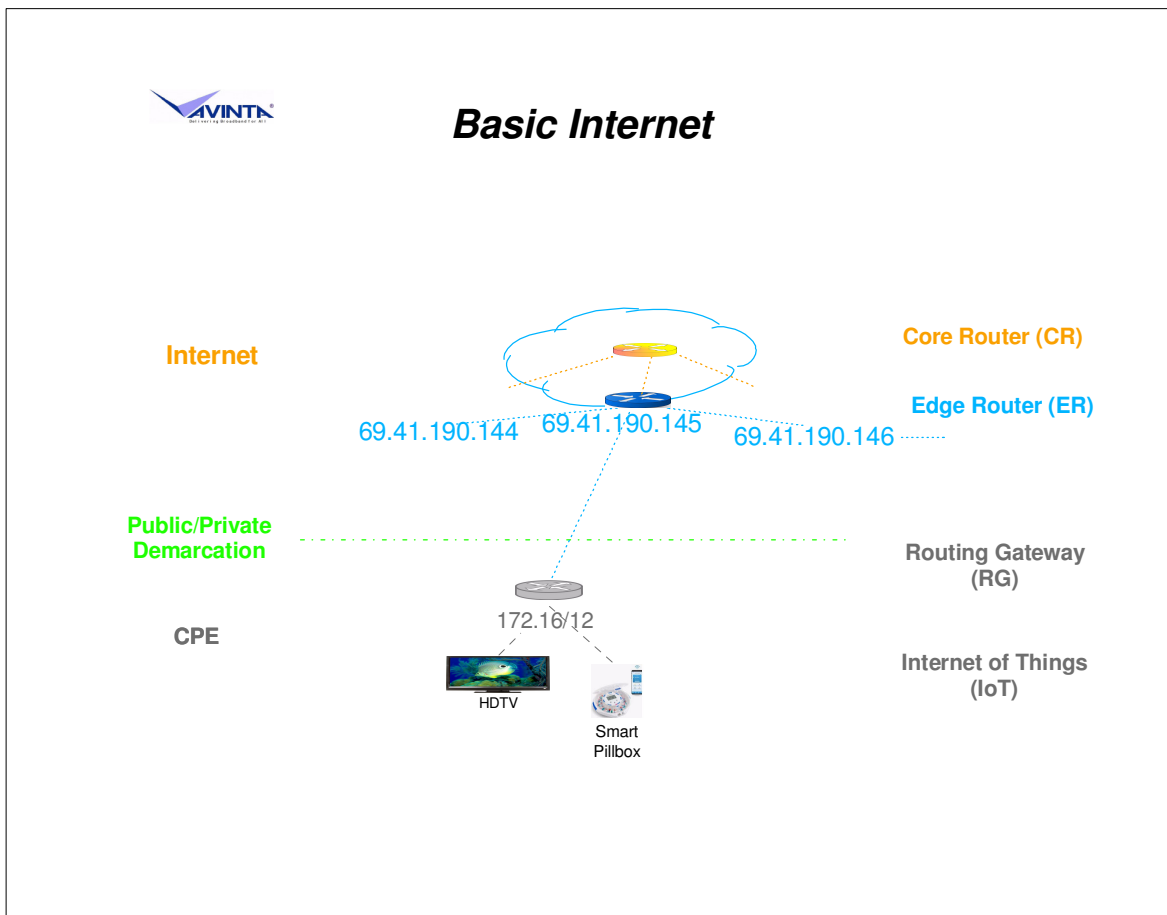
RAN vs. CDN

Presentation to

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- EzIP Project proposes to revamp the Internet from the ground up by streamlining its configurations and operations to mitigate issues all the way up to the cybersecurity vulnerability. Since EzIP touches quite a few aspects, it has been challenging to present it concisely, yet sufficiently clear to a wide range of audience.
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- This short presentation distills the essential technical considerations to establish a parallelism between the currently predominate Internet operation mode, CDN (Content Delivery Network) and the proposed EzIP's RAN (Regional Area Network).
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- So that it will become apparent that EzIP is in fact a straightforward enhancement to the current Internet by simply utilizing a different set of netblock addresses.
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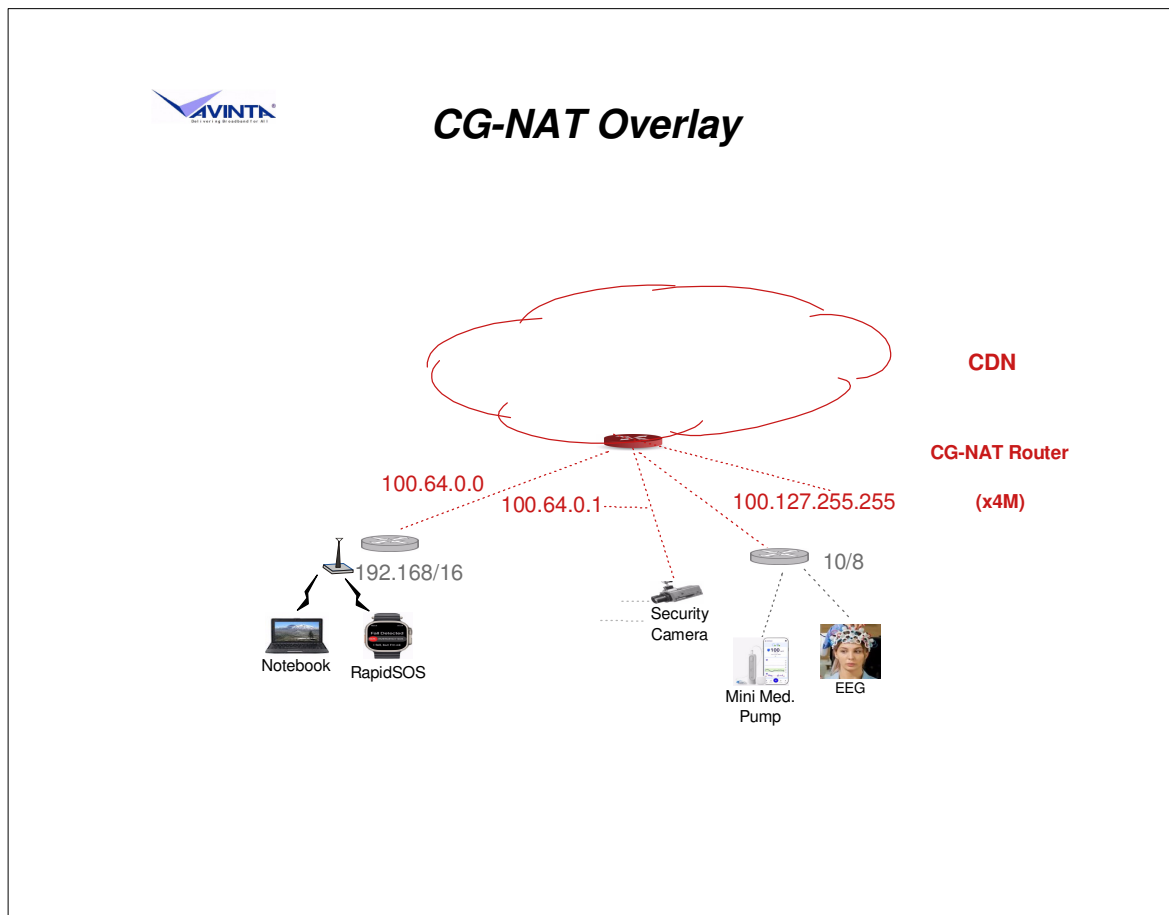


■ We will utilize a couple graphic diagrams to describe the related architectures.

■ This is the basic Internet configuration:

■ CR (Core Router) -> ER (Edge Router) -> RG (Routing / Residential Gateway) -> IoTs (Internet of Things).

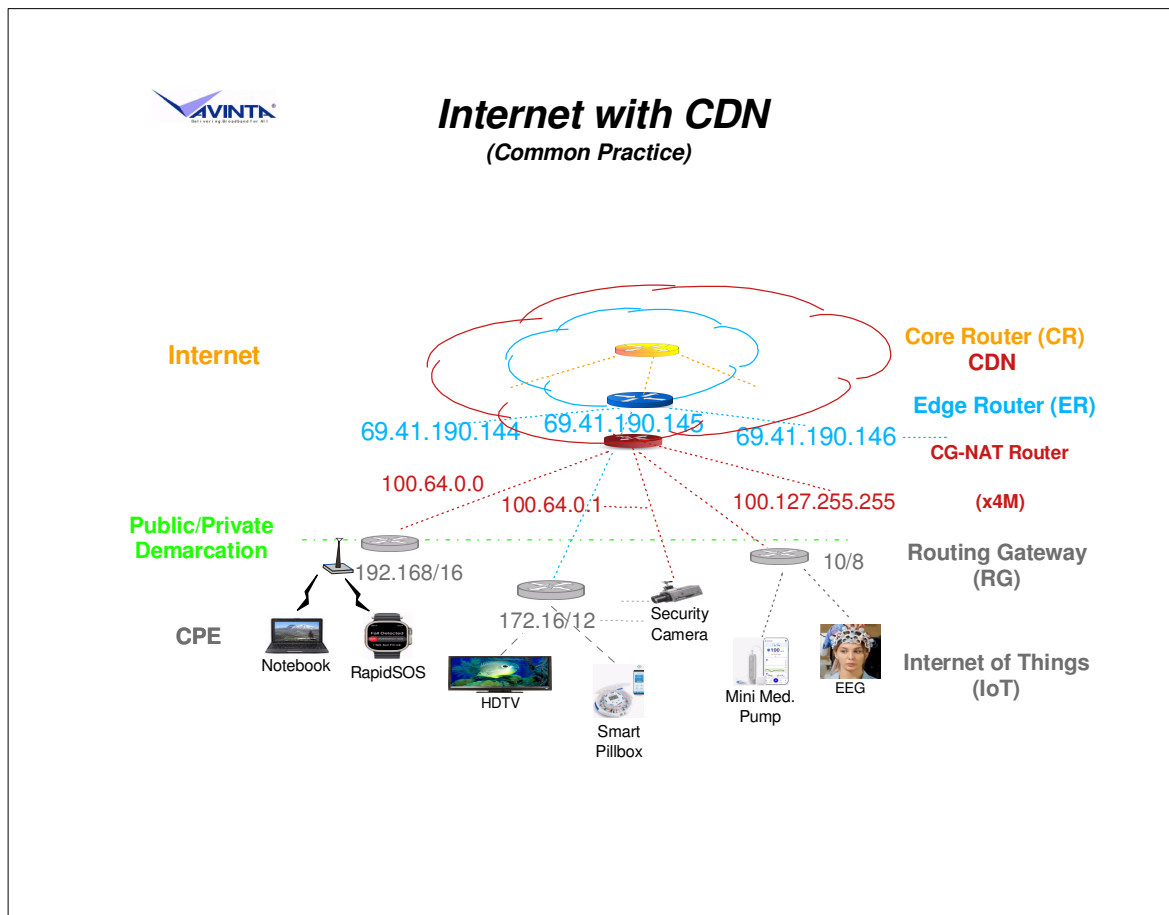
■ Due to the limited IPv4 public address pool, there are not enough addresses to identify the entire global population.



■ CG-NAT routers operate with 100.64/10 (RFC6598) addresses to expand IPv4 public address between an ER and RGs. Within each CG-NAT router, peer communication is possible. However, its NAT mechanism renders inter-CG-NAT connectivity difficult.

■ To serve a market, each CDN (Content Delivery Network) requires one or more CG-NAT routers sharing the same 100.64/10 netblock with a limited total of 4M addresses. This necessitates the dynamic reassignments of the same addresses, resulting in a none unique subscriber identification system. This practically stops every subscriber from contacting another to initiate a communication session.

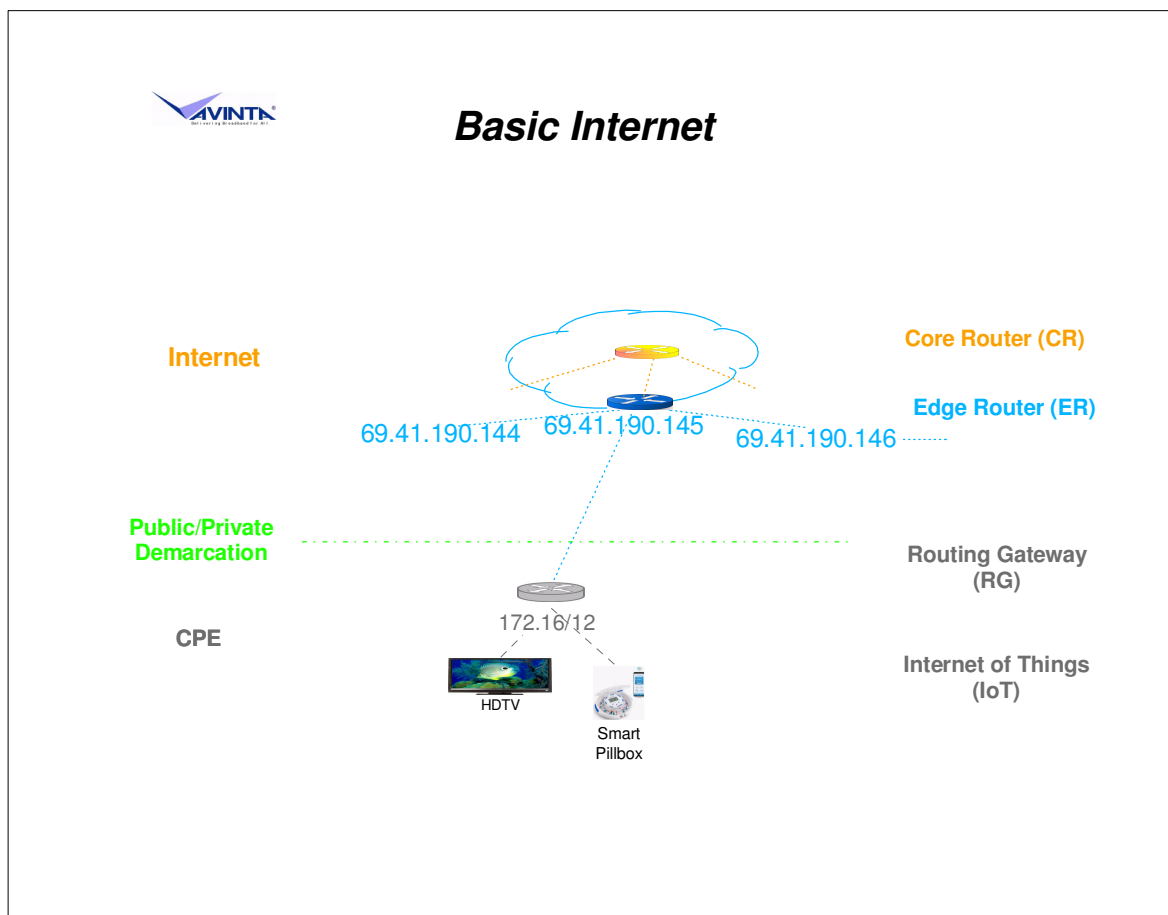
■ Global Internet configuration consists of many CDNs. Properly labeling each of them to be addressable poses another layer of the hurdle to end-to-end communication between subscribers.



■ Overlaying the CDN on the basic Internet, the current predominant Internet configuration is established.

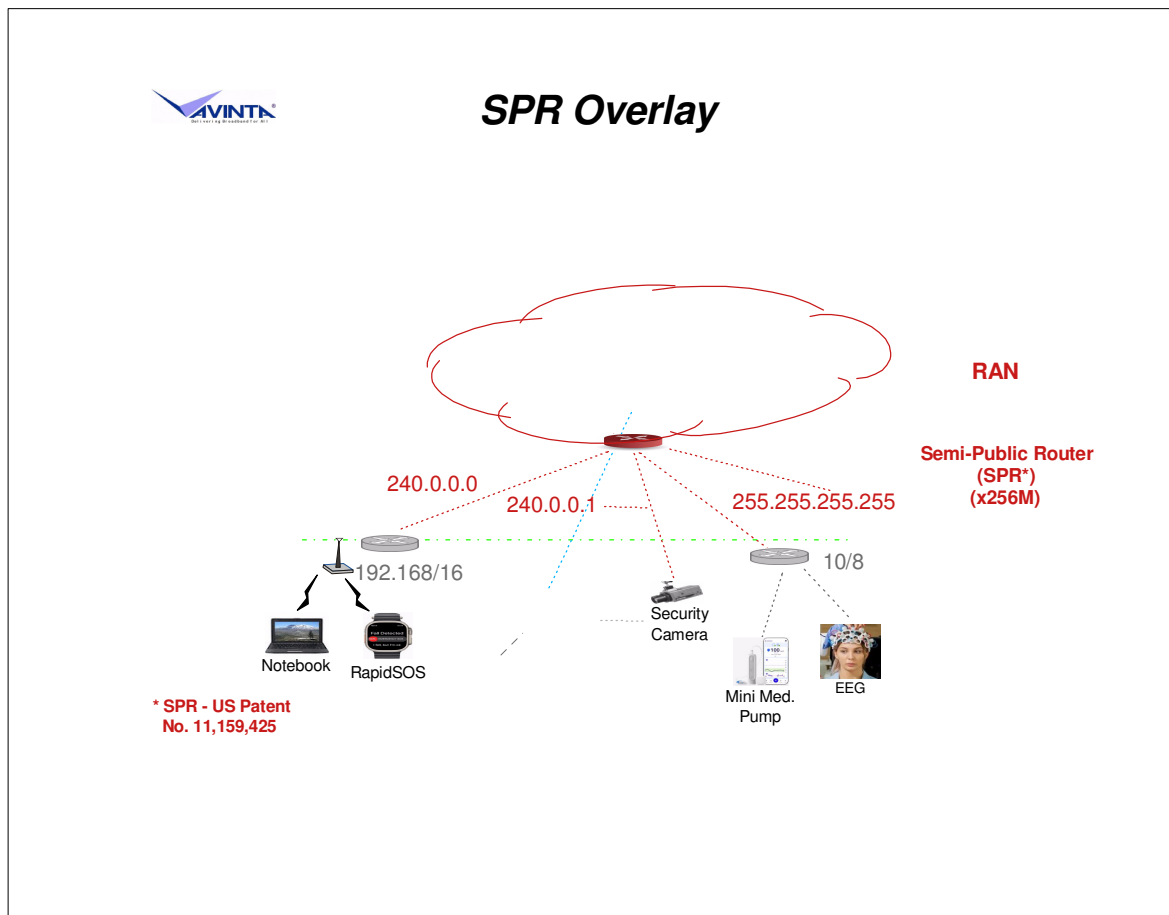
■ Although CG-NAT technology facilitates content delivery by sharing the limited IPv4 address, it prevents the end-to-end connectivity that is a rudimentary capability expected of a global communication infrastructure.

■ Without end-to-end connectivity, the Internet operations become centralized which negates the initial core promise that the Internet is for everyone.

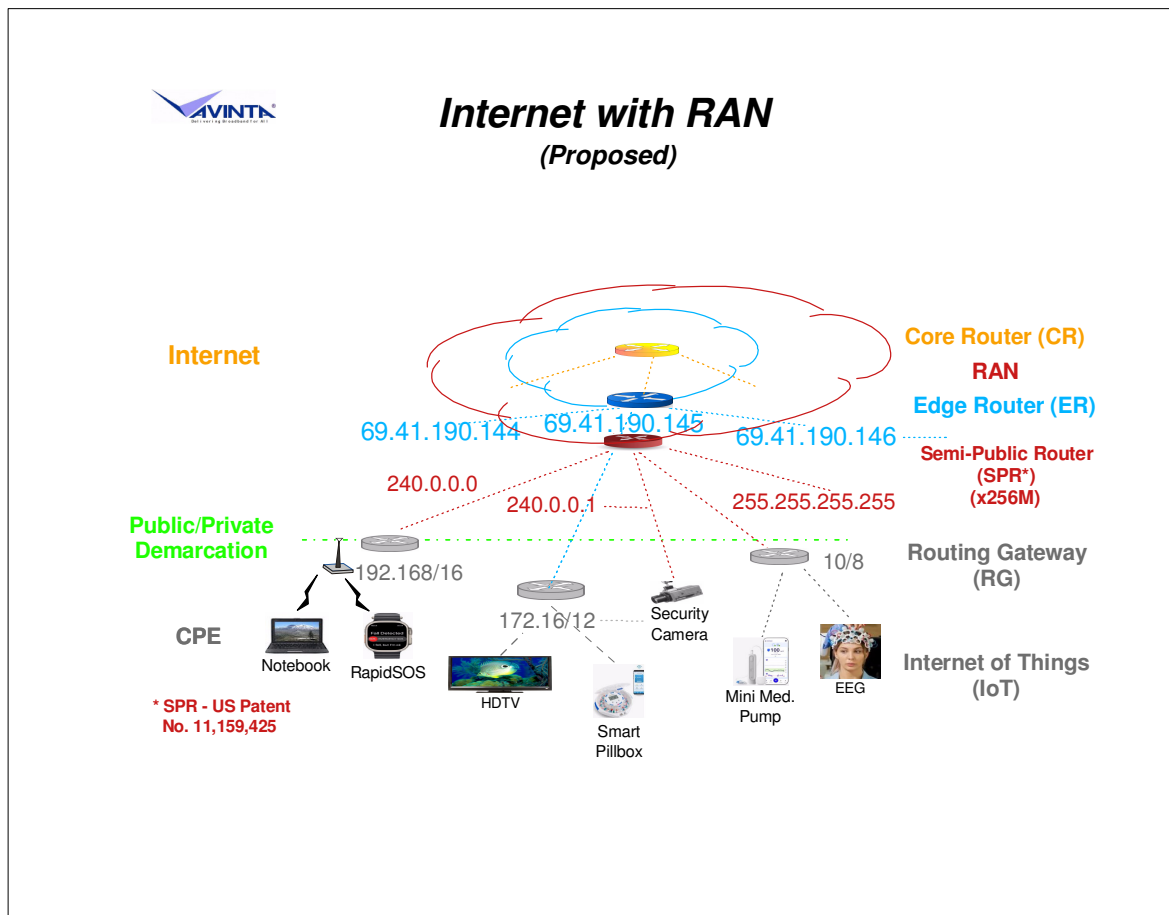


■ To look at EzIP network, let's start from the Basic Internet configuration again:

■ CR (Core Router) -> ER (Edge Router) -> RG (Routing / Residential Gateway) -> IoTs (Internet of Things).



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- SPR routers operate with 240/4 (Class E) addresses to expand IPv4 public address between an ER and RGs. Within each SPR, peer communication is straightforward. Since SPR operates with static address, the direct inter-SPR connectivity is also possible.
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- ▶ To serve a market, each RAN (Regional Area Network) requires one or more SPR routers sharing the same 240/4 netblock with a total of 256M addresses. The size of this pool enables assigning static address to every subscriber within one RAN. Thus, one subscriber initiating a direct communication session to another within the same RAN becomes natural.
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- ▶ Global RAN configuration consists of finite number of RANs. This allows identifying each with static IPv4 public address, so that any subscriber can contact another directly, realizing true global end-to-end connectivity.



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- Overlaying the RAN on the basic Internet, the proposed EzIP network is formed. It has the same architecture as the CDN on Internet configuration for supporting the common slave-initiated master-slave content delivery operations. Beyond such, the difference begins due to the size of the netblock used.
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- The EzIP's 64-fold addressing capacity increase over CG-NAT is significant. It enables the use of static address throughout a RAN supporting the initiation of a session by any subscriber to another, essentially mimicking traditional private telephone calls.
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- This streamlines the Internet operations by avoiding the dynamic setups which have been the primary vulnerability to cybersecurity breaches.
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- Since both CDN and RAN are overlay networks on the same Basic Internet and each is addressable from the Internet core via an IPv4 public address, respectively, they can coexist indefinitely. During the introduction of the RAN, this enables users to subscribe to either or both facilities for experimenting and comparing, before deciding on which one to settle with.
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- Note that the number of worldwide RANs required is finite because;
 - If each person is assigned with one 240/4 address, only 4 countries (India, China, US and Indonesia) have population exceeding the capability of one RAN.
 - If RANs focus on serving premises, only India and China have more premises than the capacity of one RAN (based on US statistics of average three residents per household).
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