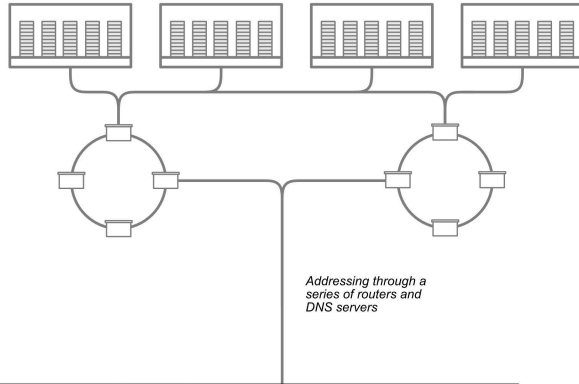


# Aggregation networks and core networks

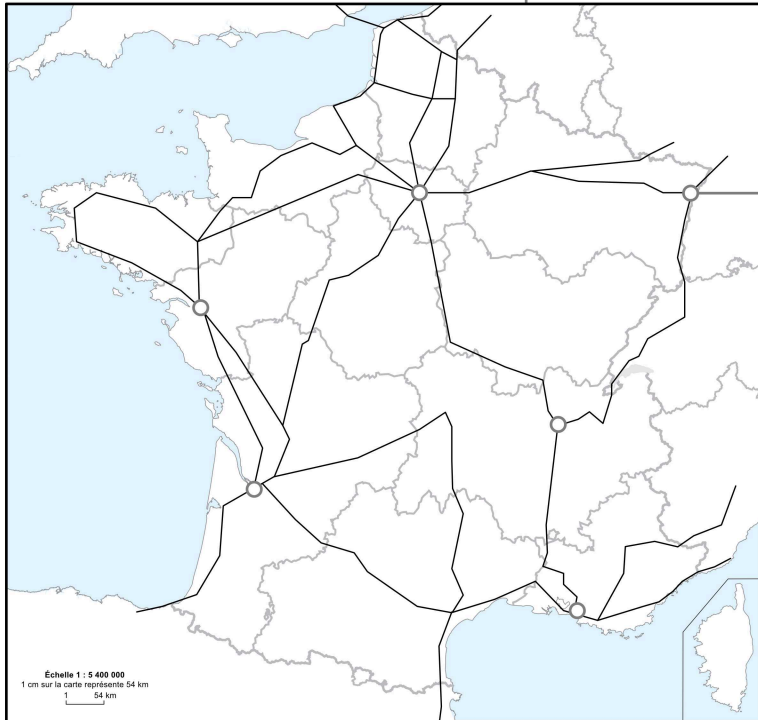
## Internet

All information will pass through a network of infrastructures (colocation data centers, operator site, internet exchange points, operators, autonomous networks) to finally arrive at a terminal. This path is organized by what is called the Internet Protocol (IP) via routers and DNS servers.

The physical transfer of information via the Internet in physical infrastructures is complex to show. However, a large part of the material layers of these infrastructures are presented to you here to facilitate the understanding of the materiality of the Internet.



Addressing through a series of routers and DNS servers



Long haul fiber optic routes

Long haul fiber optic routes make it possible to interconnect major connection infrastructures (operator networks, local loops, autonomous networks, etc.). They are the equivalent of submarine cables on land. These networks generally follow the other infrastructures (highways and railways).

Sources : Matériel basé sur les séries 900X de Cisco ou les séries SSR 900X d'Ericsson, Carte IGN 2016, localisation des fibres long haul à partir des données Infrapedia, RETN, Covage, Colt, Sipartech

Crédits : Gauthier Roussilhe

## Core networks

### Operator network

#### Telecom operator data center

The operator's site is a data center where the operator has placed its network equipment in order to manage the interconnection between its subscribers, its network and the Internet.



#### Router

The router makes it possible to make the link between the equipment of the operator site and the other sites.

#### DNS Server

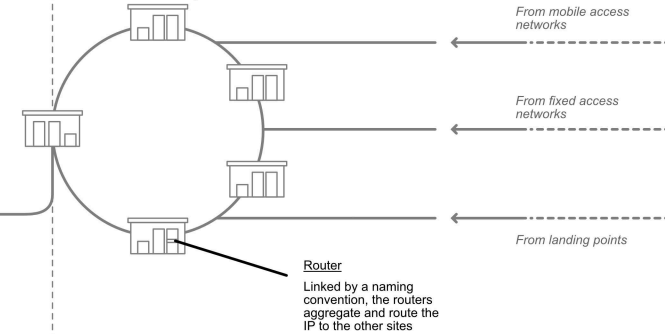
The Domain Name System (DNS) makes it possible to find the IP address associated with a domain name and to provide additional information.

## Aggregation network

### Operator Point of Presence (PoP) networks

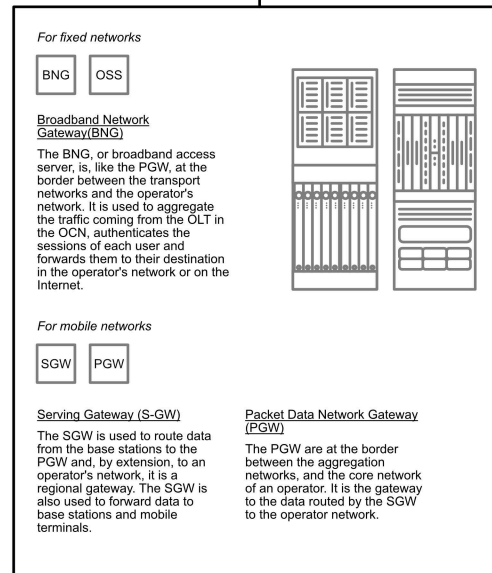
#### Point of Presence (PoP)

A point of presence designates physical equipment generally located in a data center which allows access to a specific network. An operator has many points of presence to cover all its customers.



#### Router

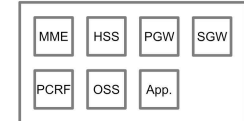
Linked by a naming convention, the routers aggregate and route the IP to the other sites



### Evolved Packet Core (EPC)

#### EPC

The EPC is a system which makes it possible to simultaneously manage the different types of connections (4G, 5G) coming from the aggregation networks. The EPC transforms the data into data packets transiting via the IP protocol. The SGW can be in a point of presence but the rest of the EPC is in the operator site



#### Mobility Management Entity (MME)

The MME is the control point of the LTE (Long-Term Evolution) mobile network. It takes care of signaling throughout the mobile network to ensure the connection between the core network and the user's terminal.

#### Home Subscriber Server (HSS)

The HSS is used for subscriber authentication. It is a register containing data relating to the subscriber authorized to use the network (SIM card number (IMSI), telephone number (IMEI), international information, etc.).

#### Policy and Charging Rules Function (PCRF)

The PCRF is a software that manages in real time the different levels of quality of service (prioritization of emergency numbers for example) and the billing rules.

#### Operations Support System (OSS)

OSS are computer systems that manage the general operation of the network. They maintain inventory of its components and services and deal with errors.

#### Application servers

The application server is a machine used to host applications to enable their execution or display to the subscriber's terminal.

Note: the inventory presented here only concerns 4G and beyond. Fixed networks, 2G and 3G use different function names which more or less follow the same logic.