Alternative Network Deployments: Taxonomy, characterization, technologies and architectures

draft-irtf-gaia-alternative-network-deployments-01

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Objective of the "Alternative Networks" draft

What are the objectives and the contribution of the draft?

- **To propose a classification**, and therefore a set of shared terms and definitions to be used in future documents (developed by GAIA or other groups).
  - Avoid using the same term for different things
- **Survey of references** where more information and experiences can be found (13 normative and 40 informative references)
  - Protocols, technologies, etc. used in Alternative networks
  - Structure these networks follow
- **Examples of real deployments**
  - Overview of initiatives, technologies and approaches employed in these networks
  - Information about certain projects promoting an Alternative Network, etc.

(The texts in `Courier New` are from the draft)

Alignment with GAIA objectives

The **Global Access to the Internet for All (GAIA)** is an IRTF initiative that aims*

- (1) to create increased visibility and interest among the wider community on the challenges and opportunities in enabling global Internet access, in terms of technology as well as the social and economic drivers for its adoption;

- (2) to create **a shared vision** among practitioners, researchers, corporations, non governmental and governmental organisations on the **challenges** and **opportunities**;

- (3) to articulate and foster collaboration among them to address the diverse Internet access and architectural challenges (including security, privacy, censorship and energy efficiency);

- (4) to **document and share deployment experiences and research results** to the wider community through scholarly publications, white papers, presentations, workshops, **Informational** and Experimental **RFCs**;

- (5) to document the costs of existing Internet Access, the breakdown of those costs (energy, manpower, licenses, bandwidth, infrastructure, transit, peering), and outline a path to achieve a 10x reduction in Internet Access costs especially in geographies and populations with low penetration.

- (6) to develop a longer term perspective on the impact of GAIA research group findings on the standardisation efforts at the IETF. This could include recommendations to protocol designers and architects.

Objective of this presentation

- To discuss and to get your feedback (also in the list) about:
  - Structure of the document
  - Classification
  - More examples
  - Sections to be improved, extended or shortened

- Have we forgotten some networks?

- Have we forgotten some protocols?

- Have we forgotten some scenarios?

We have tried to incorporate all the feedback received from the list, mainly about definitions and classification. (Thanks!)

Structure of the draft (more details in next slides)

1. **Introduction**

    1.1. Traditional networks

    1.2. Criteria for the classification of Alternative Networks

2. **Classification** of Alternative Networks

    2.1. Community Networks

    2.2. Wireless Internet Service Providers WISPs

    2.3. Shared infrastructure model

    2.4. Crowdshared approaches, led by the people and third party stakeholders

    2.5. Testbeds for research purposes

3. **Scenarios** where Alternative Networks are deployed

    3.1. Digital Divide and Alternative Networks

    3.2. Urban vs. rural areas

    3.3. Gap between demanded and provided communications services

    3.4. Topology patterns followed by Alternative Networks

4. **Technologies** employed

    4.1. Wired

    4.2. Wireless

5. **Upper layers**

    5.1. Layer 3

    5.2. Transport layer

    5.3. Services provided

1. Introduction. 1.1 Definition

Definition of "**Traditional Network**"

- Regarding **scale,** they are usually **large** networks spanning entire regions.

- **Top-down control** of the network and **centralized** approaches are used.

- They require a **substantial investment** in infrastructure.

- **Users** in traditional networks tend to be **passive consumers,** as opposed to active stakeholders, in the network design, deployment, operation and maintenance.

Alternative Network Deployments

This term includes a set of network access models that have emerged in the last decade with the aim of bringing Internet connectivity to people, following **topological, architectural and business models different from the so-called "traditional" ones,** where a company deploys the infrastructure connecting the users, who pay a subscription fee to be connected and make use of it.

1. Introduction. 1.2 Classification criteria

- Commercial model / promoter
  a community of users, a public stakeholder, a company, etc.

- Goals and motivation
  reducing capital expenditures, reducing operational costs, extending coverage to underserved areas, etc.

- Administrative model
  centralized or distributed.

- Technologies employed

- Typical scenarios
  urban, rural, developing countries, etc.

At the beginning of each subsection, a table is presented including a classification of each network according to the defined criteria. Your feedback about these tables will be highly appreciated.

2. Classification. 2.1 Community Networks

(…) **large-scale, distributed, self-managed** networks sharing these characteristics:

– They are built and organized in a **decentralized and open** manner.

– They **start and grow organically,** they are open to participation from everyone, sometimes sharing an open peering agreement. Community **members** directly **contribute active** (not just passive) network **infrastructure**.

– **Knowledge** about **building and maintaining** the network and ownership of the network itself is **decentralized and open**. Community members have an obvious and direct form of organizational control over the overall operation of the network in their community (not just their own participation in the network).

– The network can serve as a **backhaul for providing a whole range of services** and applications, from completely free to even commercial services.

2. Classification.

2.2 Wireless Internet Service Providers

WISPs are **commercially-operated** wireless Internet networks that provide Internet and/or Voice Over Internet (VoIP) services. They are most common in **areas not covered by (…) telcos or ISPs**.

2.3 Shared infrastructure model

When **users already own a deployed infrastructure**, either individually or as a community, **sharing that infrastructure with an operator** represents an interesting win-win solution that starts to be exploited in some contexts.

Example: (…) deployment of **3G services in rural areas** in which there is a broadband rural community network.

2. Classification.

2.4 Crowdshared approaches, led by the people and third party stakeholders

```
the home router creates two wireless networks:
one of them is normally used by the owner, and
the other one is public.  A small fraction of
the bandwidth is allocated to the public
network.
```
Examples: City councils, companies, big operators

2.5 Testbeds for research purposes

```
the initiative to start the network is not from
the community, but from a research entity (e.g.
a university), with the   aim of using it for
research purposes (…).
```

3. Scenarios

3.1. Digital Divide and Alternative Networks

- Definition of "Developing Country" and "Digital Divide".

- Efforts from governments and international organizations focused initially on improving and extending the existing infrastructure in order not to leave their population behind.

3.2. Urban vs. rural areas

- Leveraging on existing Alternative Networks for improving coverage

3.3. Gap between demanded and provided communications services

- When the market fails to provide the demanded services, citizens may be compelled to take a more active part in their design and implementation

3.4. Topology patterns followed by Alternative Networks

- Growth patterns
- Length of the links

4. Technologies employed

One – three paragraphs summarizing each section, as long as it is related to Alternative Networks. References about technologies, protocols, etc.

```
4.1.  Wired
4.2.  Wireless
      4.2.1.  Antennas
      4.2.2.  Physical link length
            4.2.2.1.  Line-of-Sight
            4.2.2.2.  Transmitted and Received Power
      4.2.3. MAC Protocols for Wireless Links
            4.2.3.1.  802.11 (Wi-Fi)
            4.2.3.2.  GSM
            4.2.3.3.  Dynamic Spectrum
                  4.2.3.3.1. 802.11af
                  4.2.3.3.2. 802.22
```

Questions: Is the length of each section adequate? Is the relationship with Alternative Networks clear?

5. Upper layers

One – three paragraphs summarizing each section, as long as it is related to Alternative Networks. References about protocols, research papers, etc.

```
5.1.  Layer 3
       5.1.1.  IP addressing
       5.1.2.  Routing protocols
               5.1.2.1.  Traditional routing protocols
               5.1.2.2.  Mesh routing protocols
5.2.  Transport layer
       5.2.1.  Traffic Management when sharing network resources
       5.2.2.  Multi-hop issues
5.3.  Services provided
       5.3.1.  Intranet services
       5.3.2.  Access to the Internet
               5.3.2.1.  Web browsing proxies
               5.3.2.2.  Use of VPNs
```

Questions: Is the length of each section adequate? Is the structure adequate? Is the relationship with Alternative Networks clear?

Thanks a lot

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