

**SIRA - Satellite Internet Rural Access**  
**DART - Digital Advanced Rural Testbed**  
**Rural PAWS - Public Access Wireless**

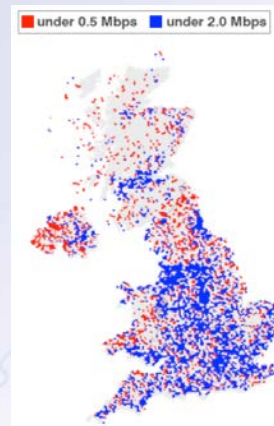
Deploying next generation satellite broadband for ubiquitous rural access

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 University of Aberdeen



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**UK Broadband “Not-Spots”**



Change from broadband as a **luxury**  
 –to broadband as a **utility**

70%–85% coverage for copper/fibre  
 Many “not spots”



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**Role of satellite broadband**

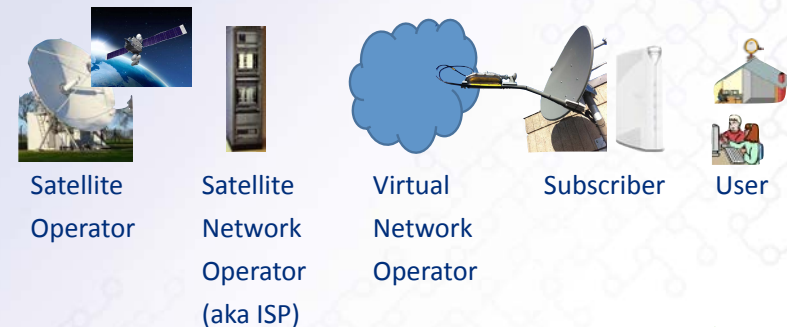
- Fibre; Cable; Fibre/VDSL
- 4G; WIMAX
- WIFI
- Satellite; etc
- No one technology is most economic



Avanti Hylas Coverage (2017)

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**Satellite Broadband Stakeholders**



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## Cost components



Equipment/Install  
~ £300-£500



Running costs 20Mbps/6Mbps  
~ £10-£70 per month

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## 3 projects - 3 ways to make this affordable

**SIRA** -  
cheap basic  
service and  
*pay when  
more needed*

**DART** -  
multicast service  
and *cached*  
content

**PAWS** -  
differentiated  
services with  
basic service  
*free by subsidy*

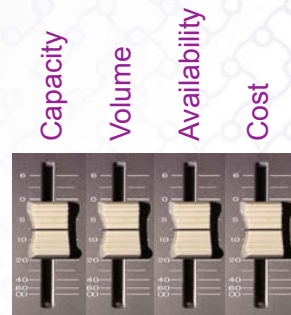


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## SIRA Micropayment Service

Pay:

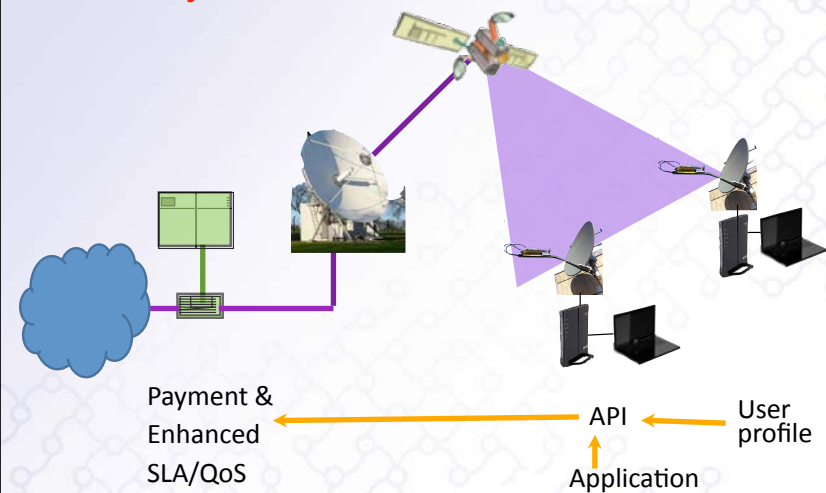
*to increase speed per hour  
to increase volume  
for rate/volume per month*



- Paid service (e.g. £20pm)
- **User** pays extra to elevate service when needed (£1/hour)
- **Content owner** pays extra to deliver what is needed (£1/GB)

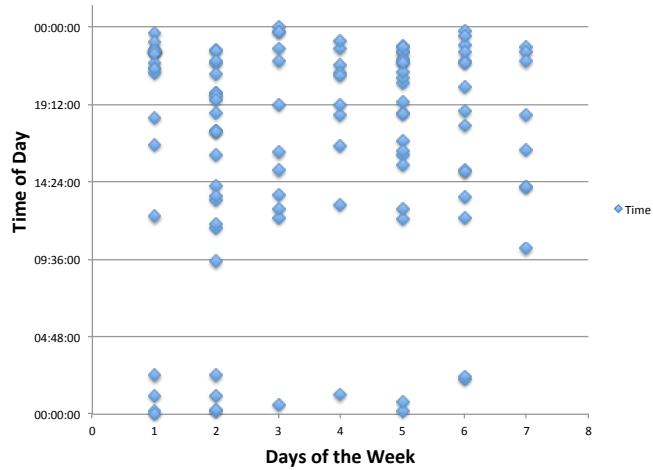
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## SIRA Dynamic SLA



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## SIRA "Boost" distribution



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## SIRA Dynamic SLA



Avanti Communications Group plc  
74 Wellington Street  
London, UK  
E20AN 8JY

Invoice number : #7  
2013-04-01 00:00:00  
Customer details  
DART0013



Description of additional charged services

| #  | Description  | Cnt | Value |
|----|--|-----|-------|
| 1  | Boost 1 Hour(2013-04-01 16:33:59 to 2013-04-01 17:33:59) | 1   | 1 £   |
| 2  | Boost 1 Hour(2013-04-01 16:34:07 to 2013-04-01 17:34:07) | 1   | 1 £   |
| 3  | Boost 1 Hour(2013-04-01 18:51:10 to 2013-04-01 19:51:10) | 1   | 1 £   |
| 4  | Boost 1 Hour(2013-04-01 18:51:19 to 2013-04-01 19:51:19) | 1   | 1 £   |
| 5  | Boost 1 Hour(2013-04-01 23:35:14 to 2013-04-02 00:35:14) | 1   | 1 £   |
| 6  | Boost 1 Hour(2013-04-02 21:37:17 to 2013-04-02 22:37:17) | 1   | 1 £   |
| 7  | Boost 1 Hour(2013-04-02 21:37:27 to 2013-04-02 22:37:27) | 1   | 1 £   |
| 8  | Boost 1 Hour(2013-04-03 22:00:44 to 2013-04-03 23:00:44) | 1   | 1 £   |
| 9  | Boost 1 Hour(2013-04-03 23:43:03 to 2013-04-04 00:43:03) | 1   | 1 £   |
| 10 | Boost 1 Hour(2013-04-04 01:08:56 to 2013-04-04 02:08:56) | 1   | 1 £   |

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## DART Multicast Service

- Data multicast to receivers
- Content encrypted before download

Cost per GB scales with number of users

### Challenges

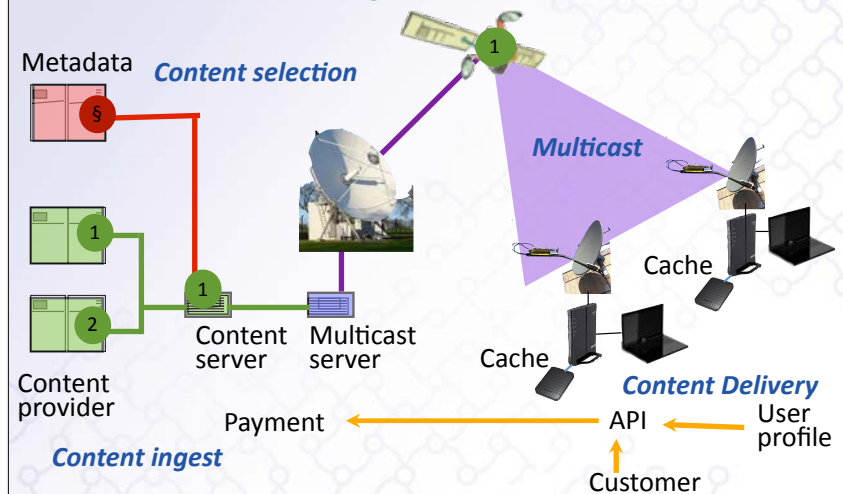
Content ingest — what to multicast?

Content protection (crypto, etc)

Pay per month/ micropayment for download

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## Multicast Caching



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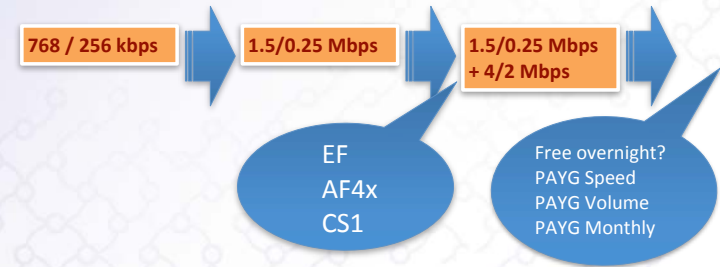
# Multicast TVoIP Caching

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# PAWS A Free Service Model

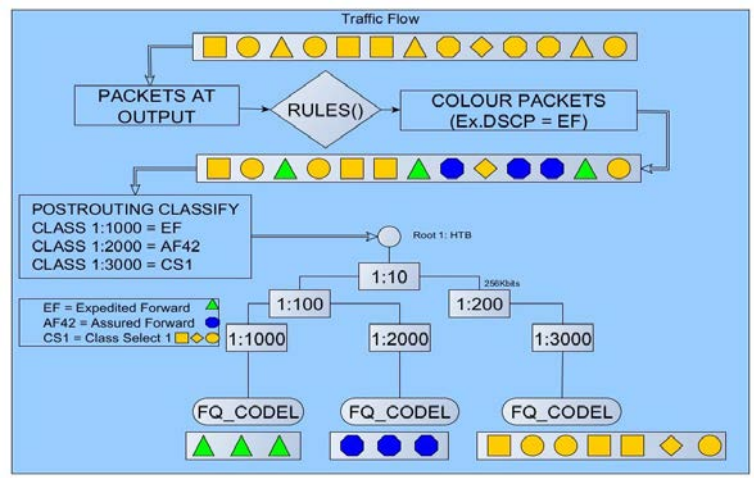
A differentiated model, 3 classes of service:

- EF: Essential services (to keep net working)
- AF4x Subsidy for services important to Government
- CS1 Basic Internet connectivity free (limited service)



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# PAWS Router Forwarding



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# Striking a balance in the PAWS service

|  |   |
|--|---|
| <b>Acceptability:</b><br>Speed<br>Volume<br>Expectation<br>Needs/wants | <b>Cost:</b><br>Who pays?<br>Loss leader v Subsidy<br>Differentiation<br>ISP acceptance |
|--|---|



A subsidised free service should not destroy the market

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## Some of the challenges

### Service Design

- Acceptable v. affordable
- Establishing a market with PAWS not destroying one
- Is whitelisting useful? - e.g. key government sites?

### Network

- Internet assumptions of higher speed access
- Leveraging multicast

### Access and Accounting

- Who is allowed to use the service?
- ISP costs to comply with legislation

## Questions



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