# REPORT OF THE TASK FORCE MEETING

# ON EAST AFRICA INTERNET EXCHANGE POINTS (EAIXPs) CONNECTIVITY,

# HELD IN KIGALI, RWANDA
## 1ST – 3RD NOVEMBER 2011

## PREPARED BY: EACO's Task Force on EAIXP

November
2011

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# EXECUTIVE SUMMARY

The Assembly of Regulators of the 13th EARPTO meeting recommended the formation of a task force to be coordinated by Kenya to work on possible ways of interconnecting all National Internet Exchange Points (**IXPs**) installed in their countries. The objective was to keep regional traffic local within East Africa. Rwanda and Burundi were not members of EARPTO by then.

The 15th EARPTO Congress Meeting held on 13th April 2007 in Nairobi, Kenya approved the Taskforce report and awarded the EAIXP tender to the Simbanet (T) Limited, P.O. Box 14827, Dar es Salaam who scored the highest points on a non-exclusive basis. However, Simbanet was unable to implement the project due to several challenges including unwillingness by ISPs to participate at the trial phase.

The 17th EACO Congress held on 7th May 2010 in Kampala, Uganda, under **Agreed 26** required the EACO Taskforce on the EAIXP to consider alternative ways of implementing the EAIXP project, and report in the next (18th ) EACO Congress. However, the taskforce was not able to meet in Rwanda as agreed during the 17th EACO Congress and deliberate on the way forward on this issue.

The 18th EACO Congress held on 27th May 2011, in Kigali, Rwanda noted that Rwanda and Burundi were yet to give their nominees to the EAIXP Taskforce chaired by Kenya. Rwanda and Burundi were therefore asked to give their nominees to the EAIXP Taskforce. The EAIXP Taskforce was asked to convene its next meeting in Kigali, Rwanda before the 19th EACO Congress.

The members of the task force from the five East African countries met from 1st to 3rd November 2011 to deliberate on the various options as well as requirements of interconnecting Kenya Internet Exchange Point (**KIXP),** Tanzania Internet Exchange Point **(TIX),** Uganda Internet Exchange Point **(UIXP),** Burundi Internet Exchange Point **(BBS)** and Rwanda Internet Exchange Point **(RINEX).**

**In the course of deliberations and proceedings, the Task Force:**

**Agreed 1:** **that,** In the case of more than one operating IXP in a country, the ideal situation would be that all IXPs would be required to connect to the national IXP in consultation with  the Regulator.

**Agreed 2:**     **that** KIXP, BBS, RINEX, TIX and UIXP shall interconnect to form the EAIXP.

**Agreed 3:**     **that,** national regulators should consider various ways of ensuring national Internet traffic stays local as well as to have in place policies to enforce connectivity for the respective service providers to their designated national IXPs.

**Agreed 4:**     **that** a ring network topology as captured under item 6.0.3 linking all participating IXPs, namely: TIX, UIXP, BBS, RINEX and KIXP, be implemented as schematically presented above. This is considered as the best compromise given the technical, operational, commercial and political considerations;

**Agreed 5: that** National IXPs lease bandwidth/links from the Network Provider(s) to interconnect with the neighbouring National IXPs ;

**Agreed 6: that** National regulators facilitate cross border interconnection of telecommunication infrastructures that will allow interconnectivity for the EAIXP;

**Agreed 7: that** neighbouring National IXPs which are to be interconnected shall coordinate with each other the technical modalities of interconnectivity;

**Agreed 8: that** the cost of interconnecting and operating the links between the IXPs be catered for by the interconnecting National IXPs;

**Agreed 9: that** the cost of interconnecting and operating the links between the IXPs, where necessary, be distributed to the various IXP members;

**Agreed 10: that** the managements of the National IXPs ensure that interconnections to the other East Africa IXPs are established and operational after EACO Congress approval;

**Agreed 11: that** the EACO Congress requests all the National IXPs to implement the EAIXP;

**Agreed 12: that** the EA Governments and Regulators need to facilitate the local ISPs

and telecom operators to implement National IXPs including the necessary management structures;

**Agreed 13: that** the EA Governments and Regulators need to facilitate the National IXPs to implement the EAIXP;

**Agreed 14: that** as much as possible, the national IXPs' ownership and management should be neutral in order to attract membership and other critical stakeholders;

**Agreed 15:    that,** the definition of local traffic within the East Africa region be looked at as traffic originating and terminating in EA **and that**, capacity  will  depend on aggregate traffic requirements (demand-driven).

The task force **AGREED 16:**  on the following implementation matrix:

| No. | Activity | Implementation time | Action by | Indicator |
|---|---|---|---|---|
| 1. | Presentation of the report to the Assembly of Regulators | During the 19th EACO Congress  to be held in May 2012 | EACO EAIXP Task Force | Report presented and recommended to the Congress for approval |
| 2. | Presentation of the report to the Joint working committee of EACO | During the 19th EACO Congress  to be held in May 2012 | EACO EAIXP Task Force | EACO EAIXP Task Force Report presented to the Joint Working Committee of EACO for Information and concurrence |
| 3. | Presentation of the report to EACO congress for approval | During the 19th EACO Congress  to be held in May 2012 | EACO EAIXP Task Force | Report presented to the Congress and approved for implementation |
| 4. | EACO to request the Regulators to formally request the IXPs to implement the EAIXP | July 2012 | Regulators | Formal letters sent by the Regulators to their respective National IXPs requesting them to implement EACO EAIXP decisions |
| 5. | Implementation of EAIXP | August 2012 to January 2013 | National IXPs | A working EAIXP |
| 6. | Monitoring of the implementation of the virtual EAIXP | During the implementation | Regulators | Monthly Reports received by the Regulators from their respective National IXPs |
| 7. | Task force meeting to be held in Tanzania to review the level of implementation of EAIXP | February 2013 | Task Force | Task Force Status Report submitted to the Assembly of Regulators for recommendation to the Congress for information/approval |

**RECOMMENDATION**

Recognising the importance of keeping the East Africa Internet traffic local to the EA region and considering that the same may not be possible without direct connectivity of all the National IXPs, it is hereby recommended that the 19th EACO Meeting **approves** actions on **AGREEDs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 15** and **16** as contained in this report.

# Acronyms and List of Abbreviations:

AIXP       -      Arusha Internet Exchange Point

BBS       -      Burundi Backbone System

BSC       -      Broadband Services Corporation (Rwanda)

CCK       -      Communications Commission of Kenya

DIXP       -      Dodoma Internet Exchange Point

EACO       -      East Africa Communications Organizations

EAIXP       -      East Africa Internet Exchange Points

EARPTO  -      East Africa Regulatory Postal and Telecommunications Organisation

GIXP       -      Government Internet Exchange Point

IXP       -      Internet Exchange Points

KENIC       -      Kenya Network Information Centre

KIXP       -      Kenya Internet Exchange Point

MIXP       -      Mombasa Internet Exchange Point

MIXP       -      Mwanza Internet Exchange Point

MTN       -      Mobile Telecommunication Network

NBI       -      National Backbone Infrastructure (Uganda)

NICTBB       -      National ICT Broadband Backbone (Tanzania)

NOFBI       -      National Optic Fiber Backbone Infrastructure (Kenya)

RINEX       -      Rwanda Internet Exchange Point

RDB       -      Rwanda Development Board

SDH       -      Synchronous Digital Hierarchy

TCRA       -      Tanzania Communications Regulatory Authority

TIX       -      Tanzania Internet Exchange

TTCL       -      Tanzania Telecommunications Company Ltd

UCC         -         Uganda Communications Commission

UETCL       -         Uganda Electricity Transmission Company Limited

UIXP        -         Uganda Internet Exchange Point

UTL         -         Uganda Telecom Limited

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## 1.0    CONTEXT AND BACKGROUND

The Assembly of Regulators of the 13th EARPTO meeting recommended the formation of a task force to be coordinated by Kenya to work on possible ways of interconnecting all National Internet Exchange Points (IXPs) installed in their countries. The objective was to keep regional traffic local within East Africa. Rwanda and Burundi were not members of EARPTO by then.

The 15th EARPTO Congress Meeting held on 13th April 2007 in Nairobi, Kenya approved the Taskforce report and awarded the EAIXP tender to the Simbanet (T) Limited, P.O. Box 14827, Dar es Salaam who scored the highest points on a non-exclusive basis. However, Simbanet was unable to implement the project due to several challenges including unwillingness by ISPs to participate at the trial phase.

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The 18th EACO Congress held on 27th May 2011, in Kigali, Rwanda noted that Rwanda and Burundi were yet to give their nominees to the EAIXP Taskforce chaired by Kenya. Rwanda and Burundi were therefore asked to give their nominees to the EAIXP Taskforce. The EAIXP Taskforce was asked to convene its next meeting in Kigali, Rwanda before the 19th EACO Congress.

The members of the task force from the five East African countries met from 1st to  3rd November 2011 to deliberate on the various options as well as requirements of interconnecting Kenya Internet Exchange Point (KIXP), Tanzania Internet Exchange (TIX), and Uganda Internet Exchange Point (UIXP), Burundi Backbone System (BBS) and Rwanda Internet Exchange Point (RINEX).

## 2.0    ELECTION OF THE BUREAU

Rwanda (RURA) was elected to chair the meeting, by proposal from Kenya (CCK) and seconded by Uganda (UCC). Kenya (CCK) and Tanzania (TISPA) were elected rapporteur and co-rapporteur respectively.

## 3.0    ADOPTION OF THE AGENDA

The Agenda of the Task Force Meeting as agreed upon is attached as **ANNEX: 1**

## 4.0    PARTICIPANTS

The list of participants is attached as **ANNEX:  2**

## 5.0    TASK FORCE MEETING DELIBERATIONS

### 5.1.    Situational Analysis

#### 5.1.1   Available Internet Exchange Points

The mandate from the 18th EACO Congress Meeting was to determine the alternative means of connecting all the national **IXPs** (i.e. TIX, UIXP, BBS, RINEX and KIXP). It was therefore assumed during the deliberations, that all countries would have one designated national IXP. However, the situation on the ground in terms of number of IXPs was **noted 1**: to be as tabulated below:

| COUNTRY | AVAILABLE No. OF IXPs | REMARKS |
|---|---|---|
| Uganda | 1 | UIXP  -  operational |
| Tanzania | 4 | TIX and AIXP  -  2 are operational DIXP and MIXP- 2 are not operational |
| Kenya | 4 | KIXP and MIXP  -  2 are operational Alma and  GIXP -  2 are not operational |
| Rwanda | 1 | RINEX - Operational |
| Burundi | None | None at the moment. IXP is to be implemented as part of Burundi's Backbone System (BBS). |

**Table 1: Available Internet Exchange Points in EA**

**Agreed 1:** **that,** In the case of more than one operating IXP in a country, the ideal situation would be that **all** IXPs would be required to connect to the national IXP in consultation with the Regulator.

**Agreed 2:** **that KIXP, BBS, RINEX, TIX** and **UIXP** shall interconnect to form the **EAIXP.**

**Agreed 3:** **that,** national regulators should consider various ways of ensuring national Internet traffic stays local as well as to have in place policies to enforce connectivity for the respective service providers to their designated national **IXPs.**

### 5.1.2 Current status on links availability for Connectivity

| No. | LINKS | CURRENT LINK AVAILABILITY | PLANNED OPTIONS | OTHER POSSIBLE SOLUTIONS |
|---|---|---|---|---|
| 1. | **TIX** (Tanzania) to **UIXP** (Uganda) | Fibre optic to the border (Mutukula)from Tanzania(pending 100km of completion. TTCL Dar to Uganda border (Bukoba town)SDH digital link. UTL/MTN fibre to Masaka town. Connection to Tanzania by next year. | | |
| 2. | **TIX** (Tanzania) to **KIXP** (Kenya) | Fibre optic to Namanga border (Full DWDM). NOFBI to Namanga border. KDN fibre to Namanga border | | |
| 3. | **UIXP** (Uganda) to **KIXP** (Kenya) | MTN Uganda optical fibre link to border (Busia) MTN fibre to Malaba border (STM 64). UETCL fibre (Tororo). UTL fibre to Malaba. NBI to Busia. KPLC cable from Mombasa to Tororo (Ug). KDN cable from Mombasa to Tororo. NOFBI/TKL to Malaba. JTL cable from Mombasa to Malaba | | |
| 4. | **RINEX** (Rwanda) to | Rwanda Fibre Backbone to Gatuna-Katuna border owned by RDB/BSC. MTN Rwanda fibre to Gatuna. | KDN fibre will be active in December | UETCL fibre between Masaka and Mbarara. |

| | | | | |
|---|---|---|---|---|
| | **UIXP**<br><br>(Uganda) | Rwandatel Microwave to Gatuna.<br>RBD/BSC fibre to Kagitumba.<br>RDB fibre to Cyanika.<br><br>MTN fibre to Katuna border.<br>UTL fibre to Katuna border.<br>NBI to Masaka | 2011. | Uganda NBI Kampala to Mbarara. |
| 5. | **RINEX**<br>(Rwanda)<br>to<br>**TIX**<br><br>(Tanzania) | RDB fibre to Rusumo border.<br>NICTBB fibre to Rusumo border. | | |
| 6. | **TIX**<br>(Tanzania)<br>to<br>**BBS**<br><br>(Burundi) | NICTBB fibre to Kabanga-Kobero border.<br>BBS fibre to Kobero-Kabanga border. | NICTBB fibre to Manyovu border – not yet operational | |
| 7. | **RINEX**<br>(Rwanda)<br>to<br>**BBS**<br><br>(Burundi) | RDB/BSC fibre to Nemba border.<br>RDB/BSC fibre to Akanyaru border.<br>BBS fibre to Akanyaru border. | | |

**Table 2: Current status of links availability and connectivity**

## 6.0   CONNECTIVITY ARRANGEMENTS

The task force reviewed three possible network topologies as follows;
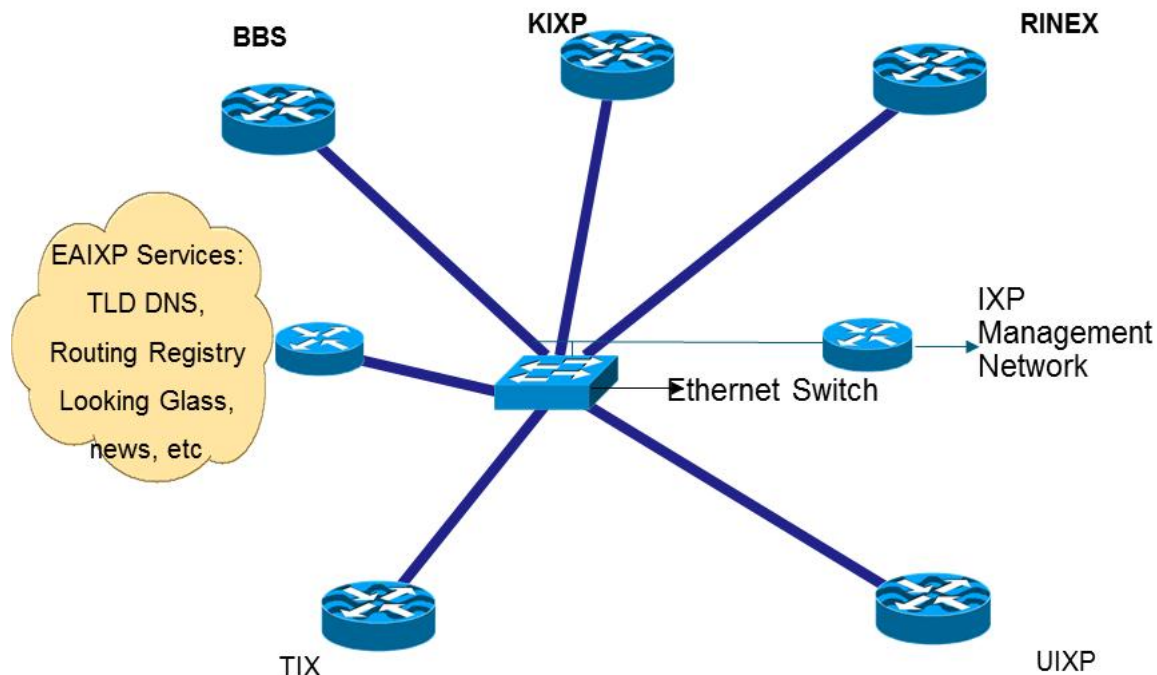
### 6.0.1   Star Topology



**Figure 1: Star Topology**

### Advantages
- Economical in connectivity (Few Connections/links);
- Can provide an avenue for hosting other common to EA Internet services such Root Servers e.g .eac TLD
- Low initial setup cost;

### Disadvantages
- Single point of failure;
- Requires an independent entity to be created to manage it. This brings challenges on the issue of locality of the entity and bureaucracy;
- High operational costs due to running the additional entity;
- No redundancy;
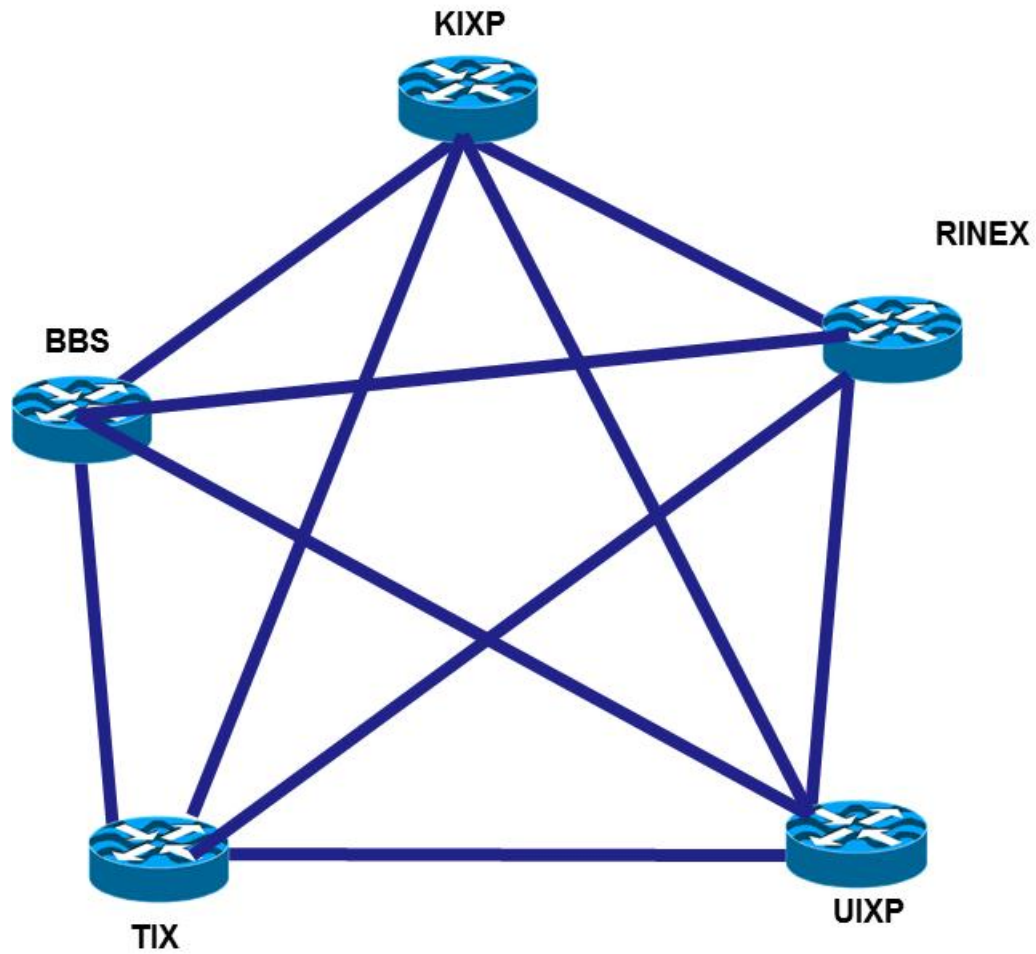
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## 6.0.2 Mesh Topology



**Figure 2: Mesh Topology**

## Advantages
- No requirement for an independent entity to be created to manage it.
- Redundancy is ensured;

## Disadvantages
- Not economical in initial connectivity (several connections/links);
- High initial setup cost;
- Technically complicated to implement
- High operational cost
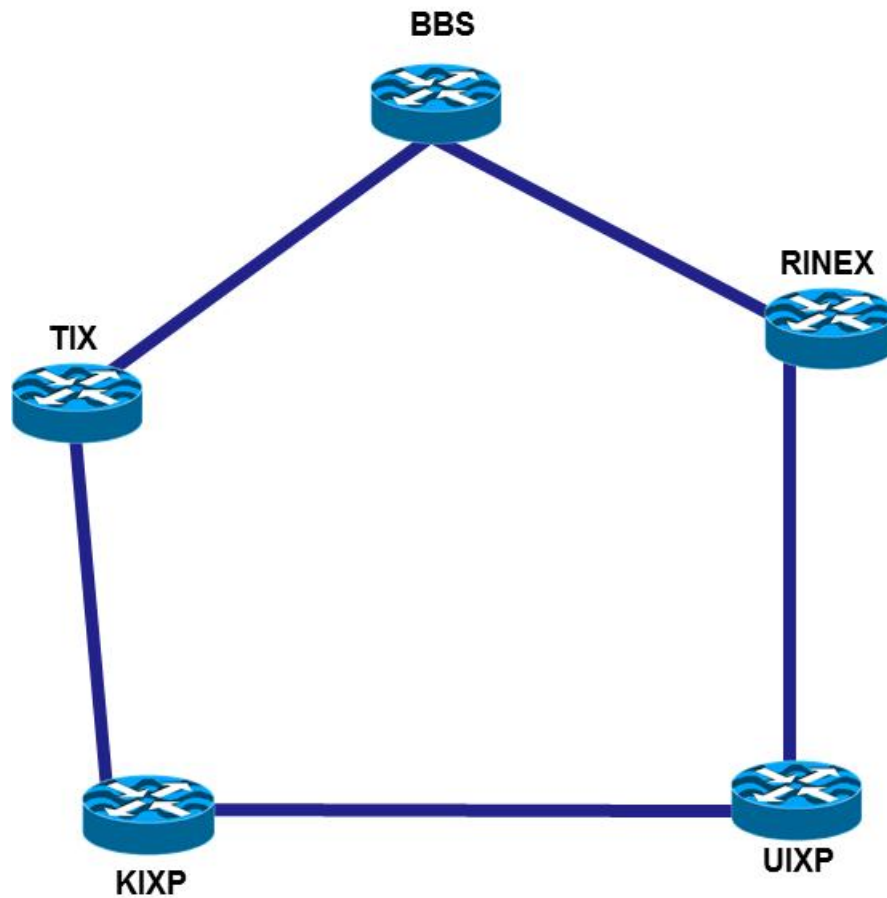
### 6.0.3　　　　Ring Topology



**Figure 3: Ring Topology**

**Advantages**
- No requirement for an independent entity to be created to manage it.
- Low operational cost;
- Technically easy to implement
- Economical in initial connectivity (minimal number of connections/links required);

**Disadvantages**
- Long distance to the furthest peer hence increased latency;

After deliberations on the three topologies, the task force recommends the following:

**Agreed 4:** **that** a ring network topology as captured under **item 6.0.3** linking all participating IXPs, namely: TIX, UIXP, BBS, RINEX and KIXP, be implemented as schematically presented above. This is considered as the best compromise given the technical, operational, commercial and political considerations;

**Agreed 5: that** National IXPs lease bandwidth/links from the Network Provider(s) to interconnect with the neighbouring National IXPs ;

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**Agreed 11: that** the EACO Congress requests all the National IXPs to implement the EAIXP;

**Agreed 12: that** the EA Governments and Regulators need to facilitate the local ISPs and telecom operators to implement National IXPs including the necessary management structures;

**Agreed 13: that** the EA Governments and Regulators need to facilitate the National IXPs to implement the EAIXP;

**Agreed 14: that** as much as possible, the national IXPs' ownership and management should be neutral in order to attract membership and other critical stakeholders;

## 6.1. Possible Implementation strategies

### 6.1.1 Establish Carrier links up to the border and interconnect

As noted before, some operators have existing links that can be used.

Under this strategy, it was **noted 2** that: there are no substantial regulatory issues for voice and the regional Carriers (TTCL, UTL and TKL) already have cross border inter-connectivity arrangements (commercially based). However, for non-voice services regulatory issues may arise.

**Agreed 15:    that**, the definition of local traffic within the East Africa region be looked at as traffic originating and terminating in EA, and  that  capacity  will  depend on aggregate traffic requirements (demand-driven).

It was further **noted 3**: that, the scope of the EAIXP may probably change over time as technology and regulations evolve.

It was further **noted 4**: that (reference section 5.1.2), optical fibre connectivity is either currently available or will be available at all cross borders.

## 7.0 WORK PLAN FOR IMPLEMENTING THE EAIXP

The task force **AGREED 16:** on the following implementation matrix:

| No. | Activity | Implementation time | Action by | Indicator |
|---|---|---|---|---|
| 8. | Presentation of the report to the Assembly of Regulators | During the 19th EACO Congress to be held in May 2012 | EACO EAIXP Task Force | Report presented and recommended to the Congress for approval |
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| 14. | Task force meeting to be held in Tanzania to review the level of implementation of EAIXP | February 2013 | Task Force | Task Force Status Report submitted to the Assembly of Regulators for recommendation to the Congress for information/approval |

## 8.0. RECOMMENDATION

Recognising the importance of keeping the East Africa Internet traffic local to the EA region and considering that the same may not be possible without direct connectivity of all the National IXPs, it is hereby recommended that the 19th EACO Meeting approves actions on **AGREEDs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 15 and 16** as contained in this report.

**Annex 1: Agenda**

**EACO EAIXP TASKFORCE MEETING, IN KIGALI, RWANDA, 1ST -3RD NOV. 2011**

**Tuesday, 1st November 2011**

| Time | Program |
|------|---------|
| 08:00-08:30 | Registration |
| 08:30-09:50 | Welcome remarks<br>DG RURA or his representative |
| 08:50-09:20 | Adoption of Agenda |
| 09:20-09:30 | Introduction of delegations |
| 09:30-10:00 | Election of Bureau |
| 10:00-10:30 | Presentation on IXP and role of EAIXP<br>By Justin RUGONDIHENE, RURA |
| 10:30-11:00 | Coffee break |
| 11:00-11.30 | Presentation on Background and mandate of EAIXP<br>By Michael Katundu, CCK |
| 11:30:12:30 | Discussions |
| 12:30-13:30 | Lunch |
| 14:00-15:30 | Meeting of elected bureau |

**Wednesday, 2nd November 2011**

| Time | Program |
|------|---------|
| 08:00-09:30 | EACO countries IXP Presentations: Positive steps and key challenges and discussions<br>   i.    Burundi<br>  ii.    Rwanda<br> iii.    Tanzania |
| 09:30-10:00 | Coffee break |
| 11:00-12:00 | EACO countries IXP Presentations: Positive steps, key challenges, sustainability and management discussions<br>   i.    Uganda<br>  ii.  Kenya – Crisphine Ogongo (CCK) & Paul Museeh (KENIC) |
| 12:00-12:30 | The Level of connectivity of each country - Michael Katundu |
| 12:30-13:00 | **Discussions**: Proposed solution for EAIXP |
| 13:00-14:00 | Lunch |
| 14:00-15:00 | **Discussions**: Proposed solution for EAIXP<br>          Work plan and way forward |

**Thursday, 3ʳᵈ November 2011**

| Time | Program |
|------|---------|
| 09:00-10:30 | Adoption of the report |
| 10:30-11:00 | Coffee break |
| 11:00:13:00 | Adoption of the report |
| 13:00-14:00 | Lunch |
| 14:04-15:00 | Adoption of the report |
| 15:00-16:00 | Closing remarks<br>DG RURA or his Representative |

| EACO EAIXP TASKFORCE MEETING, IN KIGALI RWANDA 1st to 3rd NOVEMBER 2011 PARTICIPANTS LIST | | | | | |
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