



Kan-ed Main Office: 785-296-0843
Network Operation Center: 866-984-3662

December 18th, 2008

Kan-ed Authorized Provider Peering Document

The purpose of this document is to provide guidance to business entities wishing to be recognized as a Kan-ed Authorized Provider (KAP). Such recognition authorizes business entities to represent themselves to current or potential clients as KAP's. The KAP program is designed to provide Kan-ed clients turnkey video, data communications, data transport, equipment, and services solutions.

The program is for outstanding service providers who have a reputation for quality workmanship, quality service and integrity. It is the goal and intent of Kan-ed to identify those companies most able to meet the needs of Kan-ed members, as described below. Kan-ed members will have access to a regularly updated list of qualified KAP's on a regular basis at www.kan-ed.org.

Applicants that meet the following minimum criteria will be designated as "Kan-ed Authorized Providers":

- ***Minimum of three (3) references in the Government, Education or Healthcare sector (Kan-ed or Non-Kan-ed site).***
- ***Entities must also have tax clearance from the Kansas Department of Revenue, with no outstanding taxes past due or liens from the State of Kansas.***

KAP's meeting the above criteria must also provide each Kan-ed member with a "Kan-ed Member Information Packet" which will be provided by Kan-ed and include the following materials:

- **Kan-ed acceptable use policy**
- **Kan-ed membership agreement**

- **Kan-ed product and services pricing**
- **Letter of Authorization/Release of Information Form**
- **Letter of Agency (LOA) (E-Rate)**
- **Statewide videoconference equipment contracts**
- **Other related materials**

The KAP will also agree to coordinate the following ordering and implementation services with the Kan-ed Network Operation Center (NOC) and at&t personnel:

- **Equipment**
- **Circuits**
- **IP address assignments**
- **Access to other services**
- **Notification of help desk support**

Once the above conditions have been agreed to by filling out and signing the attached a “Kan-ed Authorized Provider” form, Kan-ed will inform the successful applicant in writing that the business entity has been designated as a “Kan-ed Authorized Provider” and is authorized to so represent itself as such. Kan-ed and the Kansas Board of Regents (KBOR) reserve the right to withdraw such designation based upon a good-faith determination of a change in the applicant's ability to meet the above criteria or for a failure to perform the obligations set forth in this policy.

Technical Peering Standards

Overview

The goal of the KAP Program is to provide comprehensive, end-to-end communication solutions for Kan-ed customers, Kan-ed's NOC technical staff will remotely test network configurations to ensure functionality and interoperability. Kan-ed and the KBOR also reserve the right to perform

random on-site technical audits of peering connections to the Kan-ed network to ensure that work performed by KAP's meet industry standards.

The Kan-ed 2.0 network is based on a Layer 3 MPLS AVPN solution. The AVPN technology allows Kan-ed to focus on providing cost-effective, last-mile solutions and services without the overhead of a dedicated backbone. Most Kan-ed connections will be through AVPN ports, and many telecommunications providers will likely be subcontracted by the entity that holds the State contract for Kan-ed network services to provide local loops in their respective markets. This allows Kan-ed to maintain a technologically homogenous solution, while also including additional, local telecommunications providers. This document addresses peering solutions where a local telecommunications provider can service a number of Kan-ed connected members by offering an ISO Layer 3 solution that provides multiple services.

Demonstrated Network Support

In addition, KAP's must be able to demonstrate upon request by Kan-ed, the proven ability to provide Kan-ed members the following services, depending on the vendor area of expertise.

Member Network Management

- **Complete monitoring of router demarcation**
- **Network monitoring 24 hours per day**
- **Network documentation and updating**
- **Kan-ed monthly reporting**
- **Help desk support**
- **Proactive problem resolution and prevention**
- **Asset management**

Member Technical Support

- **Help desk support**
- **Problem resolution**

Physical Connection Description

Peering connections may be provided by one of two possible methods:

- 1) Via AVPN Peering VRF
- 2) Direct NOC connection

Except in extreme circumstances, the AVPN Peering VRF will be the preferred connection type.

AVPN Port Connections

Peers wishing to connect to Kan-ed via the Peering VRF environment will be responsible for providing co-location for a Kan-ed peering Customer Equipment (CE) router. The CE router will be supplied, operated and managed by Kan-ed. Rack space, power and cooling requirements vary depending on the Kan-ed CE router selected. Kan-ed will select an appropriate CE router based on connectivity level requirements of the peered provider. Because of this, KAP's must include Kan-ed during engineering and planning to ensure proper facilities exist. CE-to-provider connections are to be Ethernet. AVPN connections may be made by any at&t AVPN connection type (excluding FrameRelay and ATM) sufficient to handle peering bandwidth needs, providing that no oversubscription of bandwidth occurs. Kan-ed will assist with the following peering costs:

- 1) Kan-ed will work with the KAP, at&t, and the Kan-ed NOC to identify the appropriate AVPN circuit size. Kan-ed will pay for the AVPN circuit, provided that the circuit is provisioned during the E-Rate window each fiscal year.
- 2) Circuits will be sized to provide for growth, but will not be oversized by more than 50%.
- 3) Kan-ed will NOT pay for AVPN costs for KAP's that wish to peer directly with the network operation center.
- 4) KAP's are expected to purchase and maintain their own aggregation router at the co-location point.
- 5) Kan-ed will only lease one AVPN circuit per KAP.

- 6) Kan-ed will work with the KAP to determine the most cost effective co-location.
- 7) The peering partner is responsible for one-time and recurring costs associated with their CE router. AVPN connection and CE router will be managed exclusively by Kan-ed. For this reason, Kan-ed must be listed as the Management Agent for this circuit with at&t.

Direct NOC Connections

Peers wishing to connect directly at the Kan-ed NOC (or backup core location) facility must provide a data circuit to the NOC location. The peering entity is responsible for circuit provisioning, non-recurring and recurring costs. Co-location for terminating equipment is not available at the NOC. Circuits must be provided in a way that can be directly connected to Kan-ed routing/switching infrastructure. The Kan-ed NOC can accept Ethernet, DS3 (non-channelized) and OC3 peering connections. ATM and FrameRelay connections are not acceptable. Additional Kan-ed hardware required for termination of DS3 and OC3 connections will be billed to the provider by Kan-ed. Kan-ed will provide a price quote to the vendor for these items during the planning phase after all costs are identified. For these reasons, all project engineering and planning must be approved by Kan-ed before work begins. The KAP must work with the Kan-ed NOC at each step of the process to ensure effective implementation. All installation, testing, provisioning and turn-up must be scheduled in advance with the NOC.

Route Isolation for Commercial Providers

The Kan-ed network may only be accessed by Kan-ed eligible entities as defined in the Kan-ed legislation (currently “schools, hospitals and libraries”). Peering providers must ensure that only their Kan-ed member customers will gain access to the Kan-ed network. This requires that Kan-ed customers be contained within a Kan-ed specific routing environment within the peered provider network. The KAP may implement this environment within the context of virtual routers, VRF, or completely

separate routers, as long as environments are completely isolated. The commercial provider will inject a default route into their Kan-ed environment from their default environment, and the Kan-ed environment will contain all routing prefixes available via Kan-ed (including the Internet2 research network, other peered, networks, etc.). The KAP's Kan-ed routing environment will select destinations reachable via Kan-ed since the Kan-ed path will always contain a route more specific than the default.

The Kan-ed routing environment must be able to hold at least 25,000 prefixes, with the ability to grow in the future, if necessary. Additionally, no routes learned from Kan-ed may be injected into the provider's "standard" environment. Additionally, the environment must support any-source multicast and have either support for, or a defined road-map with timeline, for IPv6 unicast capability. Multicast border configuration must be PIM sparse-mode with MSDP.

BGP Requirement/Expectations

Because Kan-ed is connected to both the commodity Internet and Internet 2 networks, Kan-ed must be treated by the connecting KAP as an external ASN to their Kan-ed routing environment. Only public ASNs and globally unique IP prefixes may be used. Additionally, all prefixes advertised to Kan-ed must be explicitly advertised to the provider's other external AS peers without prefix aggregation into larger provider blocks. The minimum prefix size acceptable to Kan-ed is a "/24." Prefixes advertised to Kan-ed may be broken down for use among the KAP's Kan-ed customers in any way the provider wishes, but a clear accounting of how sub-networks are assigned must be provided to Kan-ed. Kan-ed will block access to portions of advertised networks not registered to recognized Kan-ed members. KAP's are strongly encouraged to aggregate larger blocks together for their Kan-ed environment rather than simply using multiple "/24s."

QoS Markings/Expectations

The premiere Kan-ed network service is videoconferencing (IDL/ITV, Telehealth/Telemedicine, etc.). Because of this, a strict service level is required:

- Strict priority queueing for up to 90% of connection bandwidth
- Packet loss less than 1%
- End to end latency of less than 100ms
- End to end Jitter less than 30ms

Peered providers must routinely meet these criteria. Network performance below this level will be considered “degraded”, and the Kan-ed NOC will open a ticket with the provider. It will be the provider’s responsibility to remedy the issues within a reasonable time. It is expected that the peering provider will communicate with the NOC when the issue has been resolved.

Peered networks must pass information to and from Kan-ed about which packets egressing their networks (crossing the peering boundary) require special treatment. Kan-ed has defined two DSCP (Differentiated Services Code Point) values as follows:

- DSCP EF (Expedited Forwarding, 101110) for real-time media (videoconferencing)
- DSCP BE (Best Effort, 000000) for all other traffic

Providers may implement their Quality of Service (QoS) strategy in any manner they choose, as long as the minimum service level is maintained, and the appropriate markings are used. Packets with markings other than EF or BE may be discarded. It is not acceptable to simply mark all packets being transmitted to Kan-ed as EF.

Validation of Proper Operation and Member Registry

In order to properly manage and maintain the Kan-ed 2.0 network, it is necessary to verify and validate both end-to-end service quality and resource usage. Peered providers must register the names of all Kan-ed members to which Kan-ed services are being provided. Additionally, the peering provider must register the individual IP blocks assigned to those members, both with Kan-ed and ARIN, prior to service turn-up. Kan-ed will

only allow properly registered IP blocks through the peering connection (these are sub-sets of the advertised block(s) of the provider's Kan-ed peering connection).

Kan-ed may test transport performance between end-site and Kan-ed exchange point when performance problems are reported to the Kan-ed NOC. If a chronic performance problem is discovered, Kan-ed will contact the peered provider to remedy the problem. Remedy is the responsibility of the peered provider. Un-addressed, chronic problems could lead to the revocation of Kan-ed's approved provider status.

Technical Assistance Provided by Kan-ed

Kan-ed will provide all necessary configuration parameters to facilitate the connection between the provider's edge and the Kan-ed provider-facing router. Kan-ed will not provide configuration services or troubleshooting that requires Kan-ed NOC staff to log into or otherwise interpret configuration or statistics from the peered provider's equipment. It is expected that the peered provider supply necessary technical resources to establish the peering session and test/verify performance.

Maintenance Notification Requirements

All peering providers must notify the Kan-ed NOC at least 48 hours prior to planned maintenance. Planned maintenance is any pre-planned activity that will cause any service disruption for Kan-ed members using their services, and/or any disruption in the AS peering session (interface, BGP, etc.) to the Kan-ed side of the peering session. The NOC must be notified when the maintenance activities are completed. Unplanned or emergency maintenance or other service impacting events must be communicated to the Kan-ed NOC as soon as practicable. Routine failure to communicate these events may lead to disqualification of the provider's Kan-ed approved status.

Kan-ed Authorized Provider (KAP) Application – Version December 18th, 2008

Date:

Business Entity Name:

FEIN#:

Reference 1:

Name:

Phone Number:

Reference 2:

Name:

Phone Number:

Reference 3:

Name:

Phone Number:

On behalf of our organization (listed in “Business Entity Name” above) I hereby apply for official status to become a “Kan-ed Authorized Provider”. We have reviewed the Kan-ed Authorized Provider Peering Document, and agree to meet the requirements as set forth in the document. We understand that final determination of KAP status will be made after a tax clearance check by the Kansas Board of Regents, Division of Purchases, or Department of Revenue. Upon successful determination of KAP status, we agree to work with Kan-ed staff to provide a Letter of Authorization/Release of Information form within 30 days.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Tax Clearance Verified (Kan-ed Use Only): _____

Please fax this completed form to Kan-ed at:

785-296-7052