

Effective regulation to curb grey traffic

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Contents

- Principles for curbing grey traffic
- Case study of Bangladesh in 2009
 - International incoming traffic
 - A model of traffic pathways and revenues from bypass
 - Reducing grey traffic: creating incentives
 - Reducing grey traffic: minimizing arbitrage
 - Reducing grey traffic: improving monitoring
 - Reducing grey traffic: improving competition
 - International outgoing traffic
 - Increasing competition to improve quality and reduce cost among all types of operators
 - A network topology for curbing grey traffic

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Principles

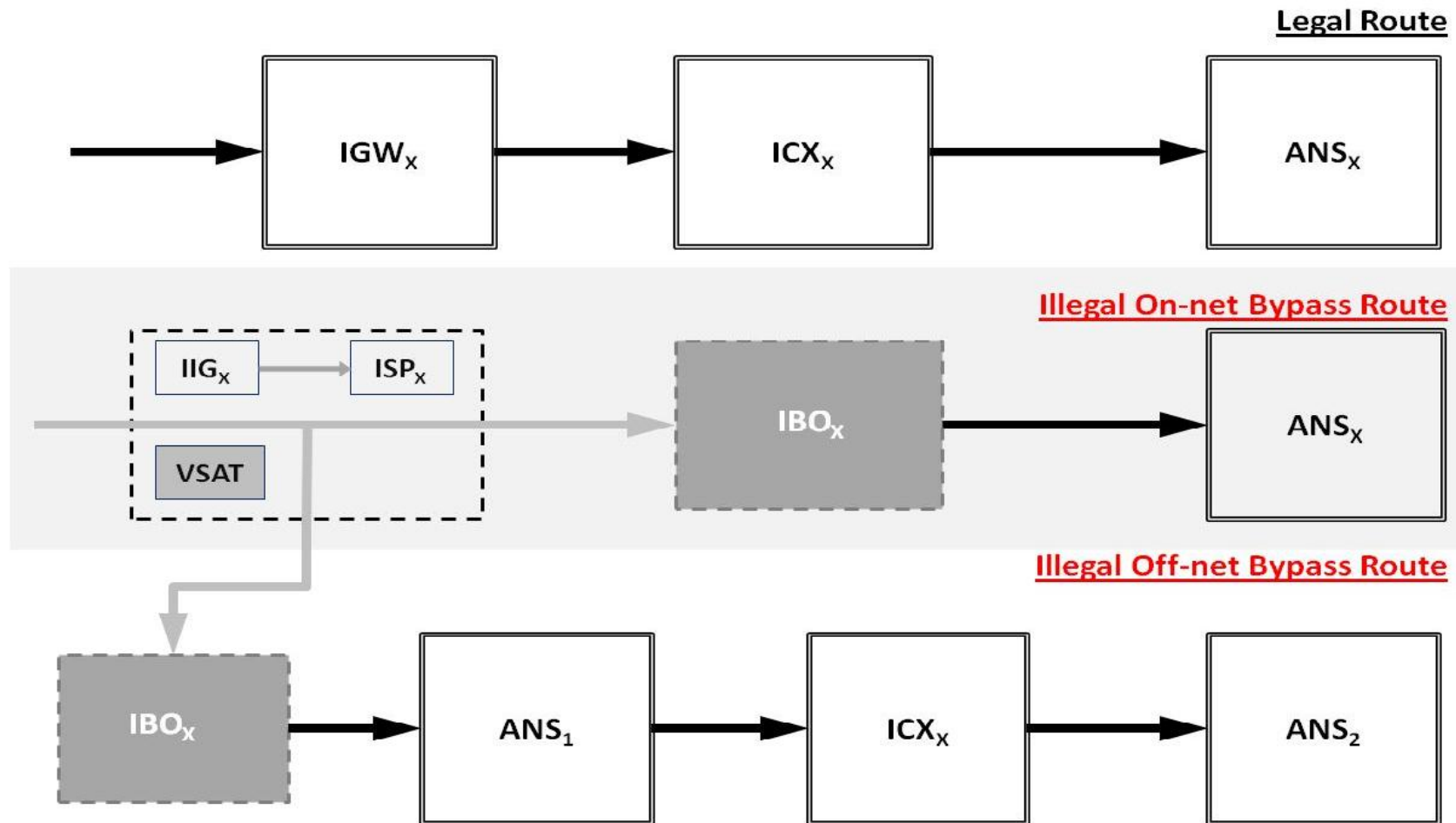
1. Minimize arbitrage between international termination rate and domestic termination rate
2. Align incentives and capabilities of all stakeholders
 - Create incentives for operators to police grey traffic
 - Incentivize subscribers to report
3. Encourage competition

A case study of Bangladesh in 2009

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International incoming voice traffic into Bangladesh: Legal versus Illegal pathway(s)



ANS = Access Network Service
ICX = Interconnection Exchange
IIG = International Internet Gateway

| **IBO** = Illegal Bypass Operator
| **IGW** = International Gateway
| **IBO** = Illegal Bypass Operator

Modeling effects of illegal bypass in international incoming calls in Bangladesh in 2009

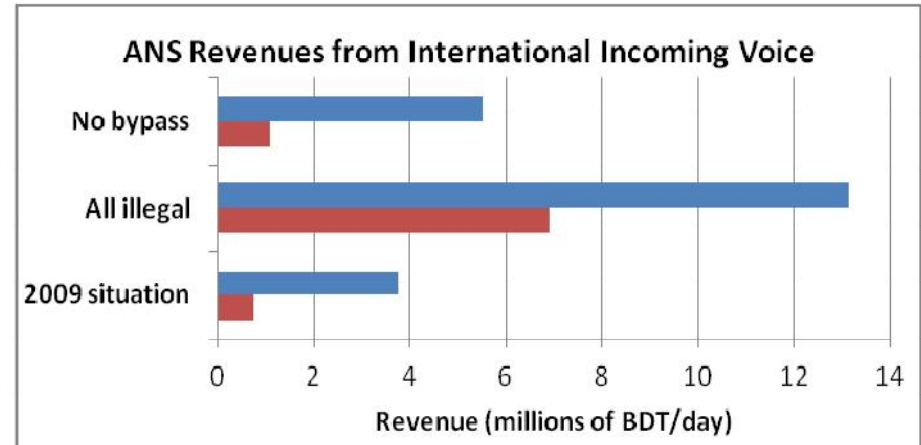
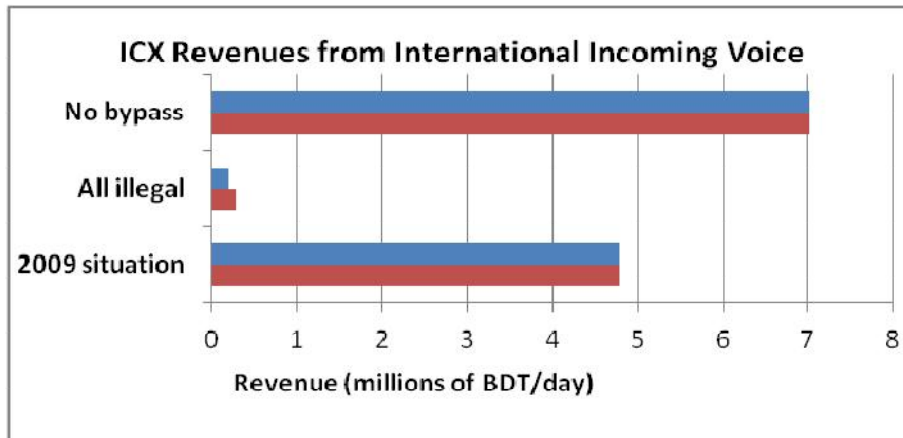
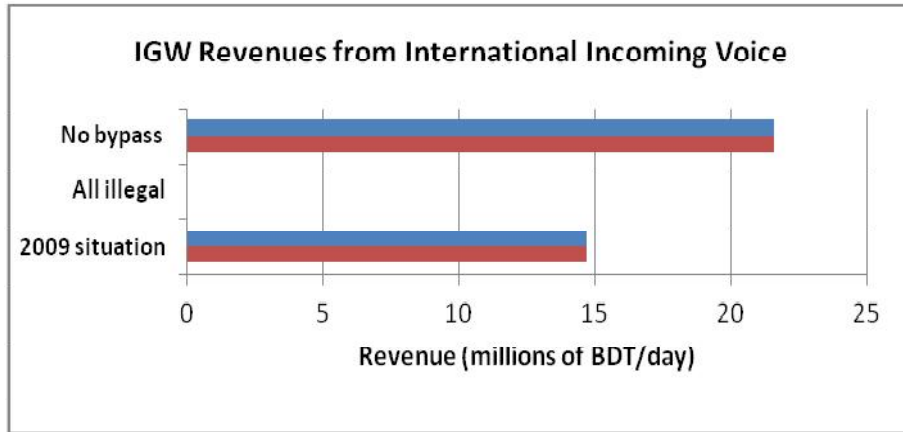
(based on publicly available information at that time)

- Available estimates suggested that there were:
 - 32 million minutes of international incoming calls per day that came via the legal route
 - 15 million minutes of international incoming calls were terminated by illegal bypass
- Only the following taxes were taken into account:
 - Revenue share of 51.75% to government by IGW operators
 - Revenue share of 65.75% to government on ICX operators
 - Revenue share of 5.5% to government on ANS operators
 - Retail VAT of 15%
- Both large and small operators were considered
 - Large operator: 30% market share, on-net charge of BDT 0.8/min, off-net BDT 1.2/min
 - Small operator: 6% market share, on-net charge of BDT 0.6/min, off-net BDT 0.7/min
- Interconnection charge of BDT 0.22/min
 - BDT 0.04/min went to the ICX and
 - BDT 0.18/min went to the terminating ANS operator
- Termination charge for an international incoming call was USD 0.03/min or BDT 2.06/min
- For simplicity assumed one IGW, one ICX and one IBO

Daily revenues from international incoming voice

■ Revenues when bypass is through a large ANS

■ Revenues when bypass is through a small ANS



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Policing bypass: Operators' incentives versus ability

Operator	Incentive to monitor?	Ability to monitor?
IGW	<p>√ Yes More bypass means less revenues</p>	<p>× No Illegal bypass enters Bangladesh as data which IGWs do not have access to</p>
IIG	<p>× No An internet gateway's revenues are based on the volume of data.</p>	<p>√ Yes Deep Packet Inspection can allow IIGs to monitor illegal bypass in real time.</p>
ICX	<p>√ Yes More bypass means less revenues</p>	<p>× No (marginal possibility)</p>
ANS	<p>× No An ANS can make more revenue by turning a blind eye to illegal bypass since an ANS can make more when an international incoming call is terminated as an on-net call on its network or when its network is used to make off-net calls to terminate on other networks</p>	<p>√ Yes ANS can monitor traffic patterns on their networks to identify sources of illegal bypass. However this can only be done after the fact.</p>

Recommendation 1: End separation of voice and data

- Converge IIGs and IGWs, creating a Unified IGWs that can carry both voice and data
 - Since illegal VOIP coming in as data will decrease revenues from voice, a **UIGW's incentive to monitor is now aligned with its ability to do so**

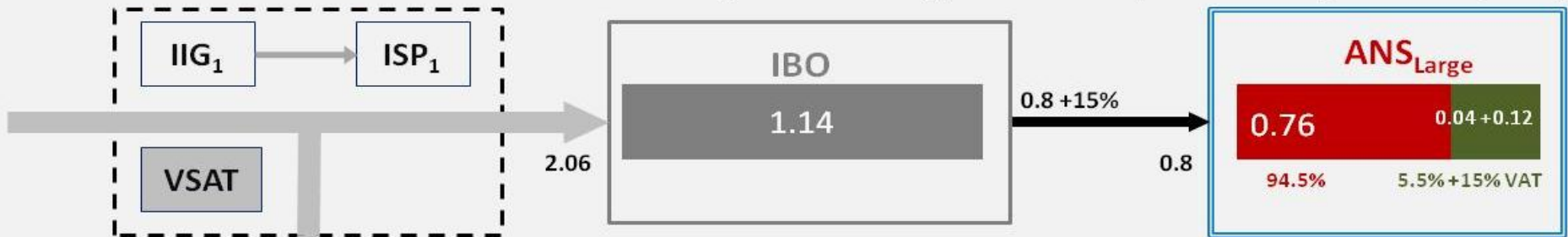
Model: How illegal bypass affects a large ANS operator



Legal Route



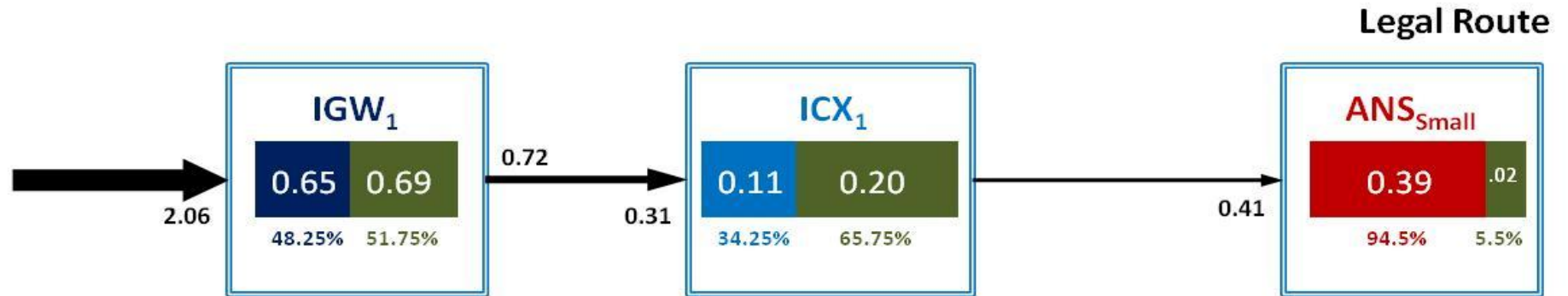
Illegal On-net Bypass Route (on-net charge: BDT 0.8/min)



Illegal Off-net Bypass Route (off-net charge: BDT 1.2/min)



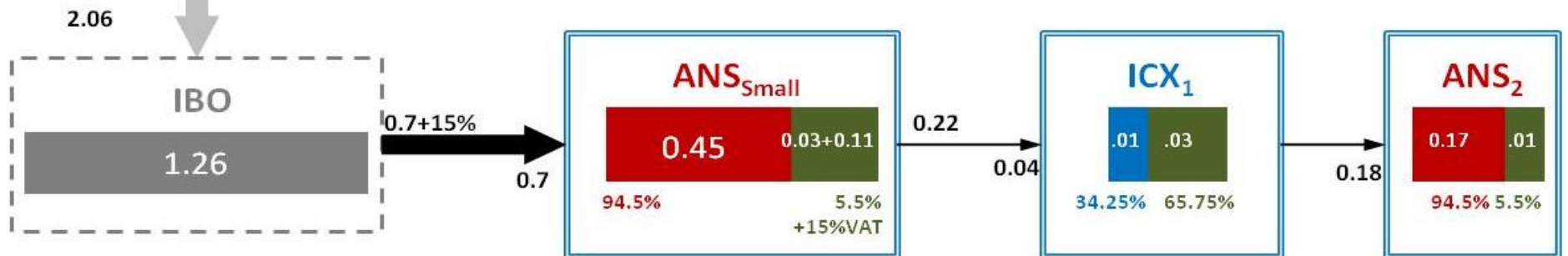
Model: How illegal bypass affects a small ANS operator



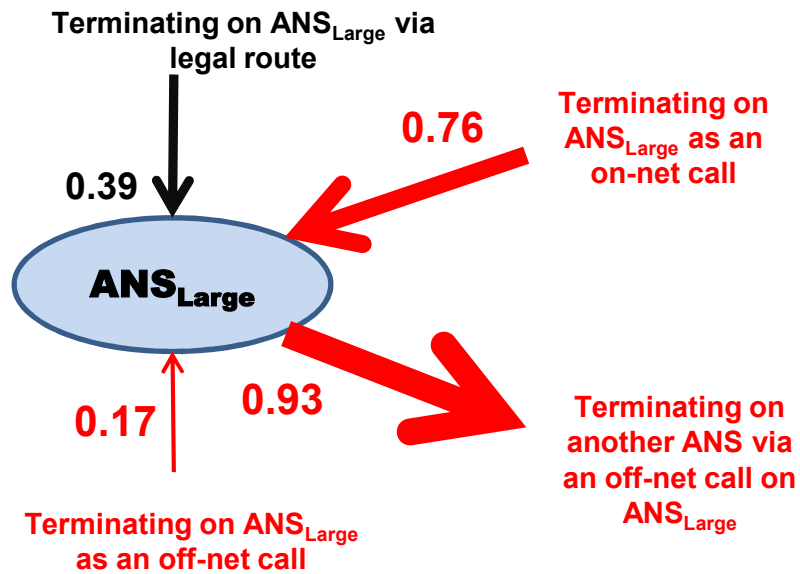
Illegal On-net Bypass Route (on-net charge: BDT 0.6/min)



Illegal Off-net Bypass Route (off-net charge: BDT 0.7/min)

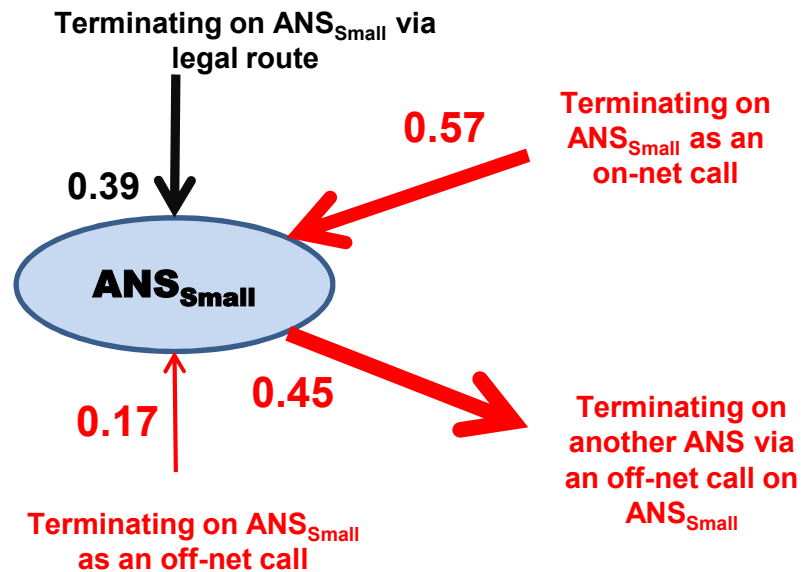


Policing bypass: Economic (dis-)incentives for an ANS to monitor



Large Operator

- The numbers are amounts (BDT/minute) received by the ANS operator from route after taxes
- Has strong incentives for calls to be terminated as illegal on-net calls



Small Operator

- The numbers are amounts received per minute by each route after taxes
- Has strong incentives for calls to be terminated as illegal on-net calls
- With only a small number of subscribers, a small operator has a strong incentive to allow international calls to other networks to be terminated illegally via his network as an off-net call.

Policing bypass: Operators' incentives versus ability

Operator	Incentive to monitor?	Ability to monitor?
IGW	<p>✓ Yes</p> <p>More bypass means less revenues</p>	<p>✗ No</p> <p>Illegal bypass enters Bangladesh as data which IGWs do not have access to</p>
IIG	<p>✗ No</p> <p>An internet gateway's revenues are based on the volume of data.</p>	<p>✓ Yes</p> <p>Deep Packet Inspection can allow IIGs to monitor illegal bypass in real time.</p>
ICX	<p>✓ Yes</p> <p>More bypass means less revenues</p>	<p>✗ No (marginal possibility)</p>
ANS	<p>✗ No</p> <p>An ANS can make more revenue by turning a blind eye to illegal bypass since an ANS can make more when an international incoming call is terminated as an on-net call on its network or when its network is used to make off-net calls to terminate on other networks</p>	<p>✓ Yes</p> <p>ANS can monitor traffic patterns on their networks to identify sources of illegal bypass. However this can only be done after the fact.</p>

Recommendation 2: Create economic incentives for ANS to monitor illegal bypass

- Increase an ANS's share of a legal international incoming call such that:
 - $(ANS_{\text{Share}} - ANS_{\text{Illegal}})$ is minimized so as to increase incentive to monitor and curb illegal bypass
 - ANS_{Share} is the per minute share of international termination charge that is received
 - ANS_{Illegal} is the per-minute on-net call or off-net call charge
 - Government earns sufficient share of the international termination charge
- In the first instance, ANS will receive BDT 0.76/minute (net) for the first year
 - This is greater than what he would be left with after taxes from an on-net domestic call
 - This is stepped down over 5 years as illegal bypass is reduced
- In the first instance, the government will receive BDT 0.65/minute (net)
 - This is stepped down over 5 years as illegal bypass is reduced

Recommendation 3: Create economic incentives for subscribers to monitor illegal bypass

- Reward call recipients to report calls they suspect to be illegally terminated international incoming voice calls. If illegality is established, caller is credited with BDT 50 of talk time on the subscriber's network.
- Service to be operated by each ANS, with monthly reports submitted to the BTRC

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Effect of domestic termination rate on the margin of an illegal bypass operator (IBO)

- When an IBO terminates on a specific ANS operators network as an off-net call from another operator's network, his revenues are dependent on the domestic termination rate:
 - If the domestic termination charge is BDT 0.22/min then his potential revenue per minute is approximately:
 - BDT 0.68 (when using a large operator's network to make off-net calls)
 - BDT 1.26 (when using a small operator's network to make off-net calls)
 - However if the domestic termination charge was reverted to the earlier rate of BDT 0.40/min then his potential revenue per minute decreases to:
 - BDT 0.48 (when using a large operator's network to make off-net calls)
 - BDT 1.05 (when using a small operator's network to make off-net calls)
- This means his per minute revenue margin might decrease by BDT 0.20 when the domestic termination charge is reverted to its original value of BDT 0.40

Recommendation 4: Revert domestic termination to earlier rate

- The theoretically optimal solution to completely eliminate illegal bypass of international incoming calls is: international termination rate = domestic interconnection rate
 - This is may not be feasible because it might deprive government of it's desired revenues from international incoming traffic
- The lower the domestic interconnection rate the higher the incentives for bypass operators
 - The lowering of the termination rate to BDT 0.22/min from BDT 0.4/min reduced the costs of bypass operators and increased incentives for small operators to turn a blind eye to the illegal termination of international incoming calls to other networks via off-net calls from their networks
 - BDT 0.22/min appeared somewhat low when compared to benchmarks
 - China: BDT 0.49 (M-F-M), Hong-Kong: BDT 0.44 (M-F-M), India: BDT 0.27 (F-M-F), Malaysia: BDT 2.36 (F-M-F), Pakistan: BDT 0.55 (M-F) and BDT 0.86(F-M), Philippines: BDT 5.05(F-M) and BDT 4.5 (M-F), Sri Lanka: BDT 2.91 (F-M) prior to SKA, Thailand: BDT 2.77 (M-F-M)
 - Best way to determine a termination rate is of course through a cost-based study, but reverting to a previous rate as an interim measure should not be controversial

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Recommendation 5: Improve monitoring and policing

- Mandate Deep Packet Inspection at the UIGW level
 - UIGWs, who have incentive to monitor illegal incoming calls, now have the ability to monitor the data traffic (Recommendation 1)
- Mandate ANS operators to monitor illegal bypass
 - Deploy traffic monitoring programs (for illegal on-net, and off-net calls from other networks as well as off-net calls to other networks) and provide findings on a monthly basis to BTRC for further action
 - ANSs' increased revenue from legally terminated calls (Recommendation 2) aligns their incentives to monitor with their ability to monitor.
- Disallow networks from accepting calls with masked CLI
 - Ensuring all calls can be traced.

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Recommendation 6: Convert ICXes into UIGWs and remove volume quotas

- Converting ICXes into UIGWs simplifies the network topology
 - Improves ability to maintain quality of service
 - Improves BTRC's ability to monitor QoS
 - Provides ICXes with an alternate revenue stream to help them obtain returns from their investments
- Existing ICXes may carry domestic traffic, but under no compulsion and on commercial terms
 - Will be preferred by small operators
- Removing guaranteed quotas gives incentives for the UIGWs to be competitive
 - Increased competition allows ANS operators to choose UIGWs who give them the best quality (relevant for outgoing international voice market)

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The situation in 2009 with respect to international outgoing voice

- The prices for international outgoing were determined by BTRC
 - 15% of charge (after deducting international settlement to foreign carriers) to be paid to IGWs
 - 15% of charge (after deducting international settlement to foreign carriers) to be paid to ICXs
 - 30% of charge (after deducting international settlement to foreign carriers) to be paid to BTRC
 - ANS operators keep 40% of the charge (after deducting international settlement to foreign carriers)
- Assured traffic volumes to IGWs and ICXes
 - This did not provide incentives for improvement in voice quality for international outgoing calls
- Lack of competition provides no incentives for ANS operators to improve quality and market international calls, and discourages subscribers from making international outgoing calls.

Recommendation 7: Allow competition to set rates for outgoing international calls while ensuring revenues for government

- Set international outgoing handling charge such that:
 - IGWs get a fixed payment (in BDT rather than as a percentage) and the rate for destination country/operator
 - The portion allocated to ICXes under ILDTS 2007 is now given to UIGWs
 - In the first instance UIGW's share of a clear channel call will be BDT 5/min for clear channel and BDT 1.50 for EISD calls, stepped down based on cost study
 - Government gets a fixed payment (in BDT rather than as a percentage)
 - In the first instance, Government's share of clear channel call will be BDT 5/min for clear channel and BDT 1.50/min for EISD calls, stepped down after two years
- UIGWs should be free to offer rates based on termination rates they negotiate in destination countries
 - Gives incentives for IGWs to compete in offering the best prices and/ or quality to ANS-es
- No price controls on ANS
 - Incentives created for marketing and market stimulation so more Bangladeshis can avail of international telephony services
- Conversion from revenue share to per-minute fixed payments is a step toward cost-based system. Competition at the UIGW level reduces the need to closely monitor the rates negotiated by UIGWs with foreign operators.

Recommendation 8: Convert UIGWs into *real* gateways

- To be real gateways, it is necessary to be able to use the SEA-ME-WE4 cable
 - Allow new UIGWs (7 in total) to partner with minority partners (up to 49.9%), who are members of SEA-ME-WE4 consortium, but do not have majority ownership in ANS:
 - This allows Bangladeshi UIGWs to learn how to navigate the complexities of the international telecom market
- Open up the cable station to allow SEA-ME-WE4 access to UIGWs on a cost-based, non-discretionary basis
 - As long as there is no competition, prices will be high, quality of service will be poor and utilization low
 - All that is needed is to change the domestic rule/understanding that Bangladesh is the only closed station in SEA-ME-WE4
- This creates incentives for UIGWs to improve service and lower costs (thereby increasing overall volumes of incoming traffic, which in turn could increase government revenues)

The situation with respect to leased lines

- BPOs in Bangladesh had to:
 - Obtain license from BTRC (subject to revenue share; few precedents)
 - Give copious details about business activity to BTRC which then issued letter specifying how much capacity was to be allowed
 - Go to BSCCL
 - Be directed to BTCL as a matter of course
 - Get capacity from BTCL
 - Unlikely to get service on weekends etc.
- Compare with BPO in another country
 - No license; no need to give details of business to govt agency
 - Purchase connectivity in desired quantity from among multiple suppliers (one-stop shop)
 - Because of competition will get services on weekends and more

Recommendation 9: One-stop shopping from multiple UIGWs for BPOs & corporates

- All UIGWs may sell international capacity (IPLC and IP)
- Call Center licenses to continue, with provisions for random inspections
 - The improved incentives for ANS and UIGWs to police traffic will prevent bypass by call center operators

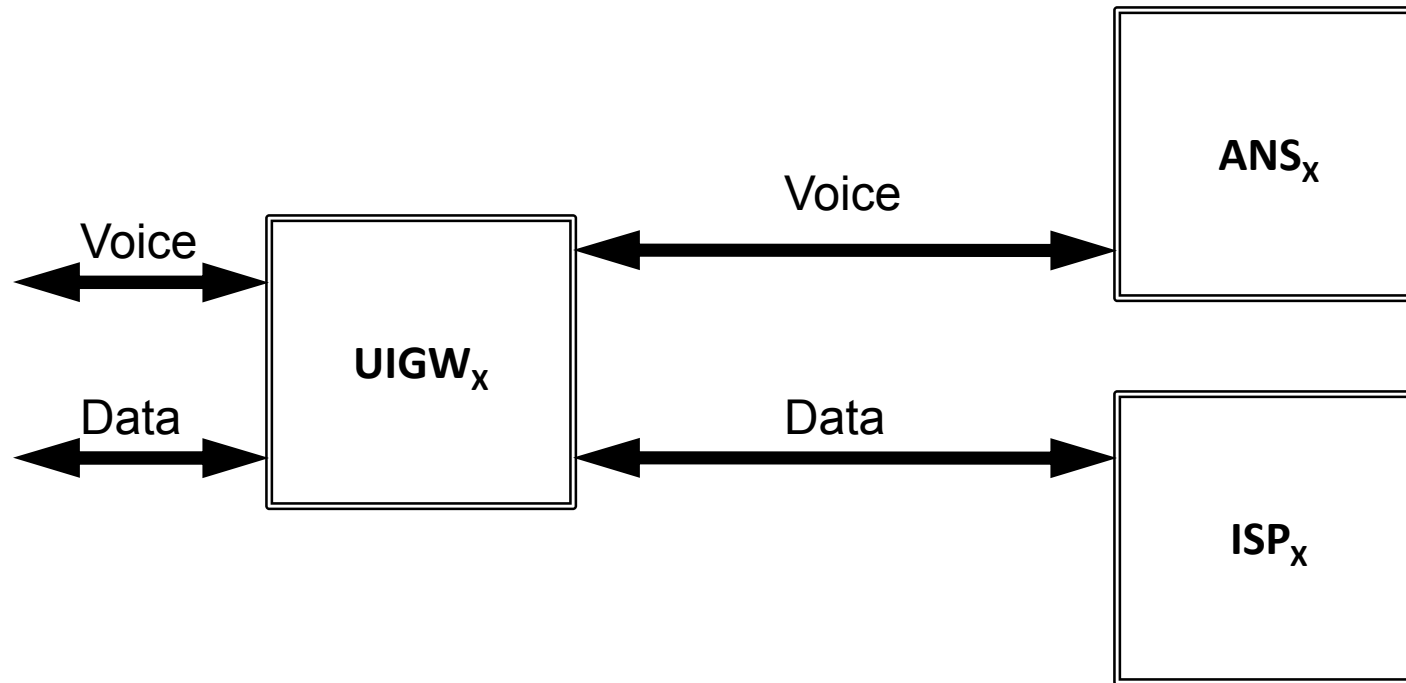
Recommendation 10: Ensure competition in the existing backbone network

- BTCL should be divested into two entities:
 - TeleTalk should be an ANS operator with both fixed and mobile customers
 - Bangladesh Telecommunications Company Limited (BTCL) should operate the cable landing station, have a UIGW license and the domestic fiber-microwave backhaul network. It will provided cost-based, non-discriminatory access to backhaul to all ANS operators and the 6 other UIGWs
 - If the submarine cable component of BTCL is not managed professionally, it may wither in competitive environment
 - Government may consider giving competent foreign entity a management contract and minority share to professionally manage the unit

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A network topology for curbing grey traffic



Competition at each node-level is essential to ensure that there are incentives for operators to improve quality and reduce price

Principles to remember

1. Minimize arbitrage between international termination rate and domestic interconnection rate
2. Align incentives and capabilities of all stakeholders
 - Create incentives for operators to police grey traffic
 - Incentivize subscribers to report
3. Encourage competition