Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)
	)
Creation of a	)
Low Power Radio Service	)　　MM Docket No. 99-25
	)

PETITION FOR RECONSIDERATION

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I. Introduction

We commend the Commission for the careful implementation of the Local Community

Radio Act in the *Sixth Report and Order* and the numerous improvements to the LPFM service

rules therein. We also seek clarification and in some cases reconsideration of new rules, primarily

those related to the protection of FM translator input signals. Where seeking clarification, we

note that the Commission may prefer to address these issues in the form of a public notice rather

than through a formal reconsideration.

II. Translator input signals

In implementing Section 6 of the Local Community Radio Act, Protection of Translator

Input Signals, the Commission has adopted rules to protect FM translators with input signals on

the third adjacent frequency to proposed LPFM stations.[1] We seek clarification or

reconsideration of a number of issues related to these rules. In particular, we seek clarification on

what appears to be a discrepancy between the revised §73.827(a) and the discussion of this rule

in the *Sixth Report and Order.* We ask for reconsideration of the locations at which non-

interference must be proven in §73.827(a)(1). We ask for clarification or reconsideration of several

aspects of §73.827(b). Finally, we discuss the quality of translator input data on file with the

Commission and the impact on LPFM applicants as well as translator owners, and we ask the

Commission to collect further data prior to the LPFM filing window.

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1   See Local Community Radio Act, Pub. L. No. 111-371, 124 Stat. 4072 (2011), §6.

A. Protection of translator input signals fed from other translators

We first seek clarification on what appears to be a discrepancy between the new LPFM rules on the protection of translator inputs and the discussion of these rules in the *Sixth Report and Order.*

The *Report and Order* concludes that "LPFM applicants must protect the reception directly, off-air of third-adjacent channel input signals from any station, including full-service FM stations *and FM translator stations.*"[2] Further, "an applicant for a new or modified LPFM construction permit may not propose a transmitter site within the 'potential interference area' of any FM translator station that receives its input signal directly off-air from a full-service FM *or FM translator station* on a third-adjacent channel."[3]

This discussion indicates that LPFM stations must protect an FM translator that receives its input signal from another FM translator station on a third adjacent station. However, the revised rule §73.827(a) seems to apply only to LPFM stations which are on the third-adjacent channel to a translator's primary station, and not to those which are third-adjacent to another translator. The revised § 73.827(a) states: "This subsection applies when an LPFM application proposes to operate near an FM translator station, the FM translator station is receiving its primary signal off-air and the LPFM application proposes to operate on a third-adjacent channel to the primary station."

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2   *Sixth Report and Order* at ¶127, emphasis added

3   *Id.* at ¶128, emphasis added

We ask the Commission to address whether §73.827(a) applies to LPFM stations which are third-adjacent to a translator which is feeding a terrestrial signal to another translator, and if so, to clarify the language of the rule accordingly.

B. Locations at which non-interference must be proven

The Commission provides two methods to demonstrate that a proposed LPFM station in the "potential interference zone" will not cause interference to an FM translator input signal on the third adjacent frequency.[4] In one of these methods, "an LPFM applicant may show that the ratio of the signal strength of the LPFM (undesired) proposal to the signal strength of the FM (desired) station is below 34 dB *at all locations.*"[5]

We do not believe that it is necessary nor reasonable that this ratio be determined at all locations. We ask if this is a clerical error, since "at all locations" may be appropriate for other interference specifications, but in this instance seems to describe an infinite task. Furthermore, it is only the site of the translator itself which must be protected in the case of translator input signal interference. We ask the Commission to modify the language of § 73.827(a)(1) to require applicants to demonstrate the ratio, not "at all locations," but "at the translator receive antenna."

On a related note, the Commission has stated that applicants may assume translator inputs are co-located with the respective translator broadcast antenna. We agree that such an assumption makes sense. In the very unlikely event that this is not the case, we note that an LPFM

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4   *Id.* at ¶128-129

5   *Id.* at ¶129, emphasis added. Also see § 73.827(a)(1). [The restrictions on LPFM applications near translator inputs in § 73.827(a) will not apply if the LPFM applicant] "demonstrates that no actual interference will occur due to an undesired (LPFM) to desired (primary station) ratio below 34 dB at all locations."

application may be flawed and we ask for the Commission's consideration in allowing the applicant to relocate.

C. Issues with § 73.827(b)

We raise several issues with the revised § 73.827(b), which states: "An authorized LPFM station will not be permitted to continue to operate if an FM translator or FM booster station demonstrates that the LPFM station is causing actual interference to the FM booster station's input signal, provided that the same input signal was in use at the time the LPFM station was authorized."

We first note that the text of this rule seems to refer first to FM translators or boosters and later only to boosters. We assume that the Commission did not intend to distinguish between translators and boosters in this language. As a clarification, we suggest that the text "FM translator or" might be inserted before the second occurrence of "FM booster."

Second, we ask that the Commission modify this rule to require that the input signal be in use "prior to the release of the public notice announcing an LPFM application window period," rather than at the time the LPFM station is authorized. This change would mirror the cutoff used for the protection of other FM stations in §73.807.[6]

As currently written, §73.827(b) would allow translator operators to modify their input signal at any time before the authorization of a proposed LPFM station, potentially rendering the LPFM applicant ineligible long after an application has been filed. Even if the Commission permits LPFM applicants to change frequencies to remedy applications affected by translator input signal changes, this may not help in all cases. If no other nearby channel is unoccupied, the

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6   See 47 CFR §73.807

applicant would lose their chance of a station as well as any fees spent on engineers and consultants. By setting the cutoff as the date of the public notice announcing an LPFM application window period, applicants can plan to protect translator input signals when they identify their channels and transmitter sites.

In the alternative, we ask the Commission to set the cutoff date as the date the LPFM application is filed. Although this would not give the applicant the opportunity to prepare an application knowing all relevant information about nearby stations, this would still be preferable to the current rule.

Finally, we ask the Commission to clarify that the term "in use" in the aforementioned rule should be understood to mean "in use as the input to that translator." This seems to be the intent of the rule, but clarification may avoid confusion since signals may be in use for some time before being used as the translator input.

D. Incomplete, contradictory and missing translator input signal data

In order to comply with the new standards for protecting FM translator input signals, LPFM applicants must know which translators are receiving their signal off air, and of those, the station or translator being rebroadcast. This information is needed for either of the two methods outlined for demonstrating a lack of predicted interference.

Prometheus has conducted a preliminary review of translator input signal records, attached here as an appendix. Nearly all translators have some kind of input signal records in CDBS.[7] However, these records are often contain contradictory or missing data, leaving LPFM applicants located near these translators with no clear way to comply.

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7 We found only three translator records without input signal data. See Appendix p. 12.

Based on our findings, more than a thousand translator records have missing, contradictory, or incomplete data. Even records that appear complete may reflect outdated information. Given the extent of the problem, we ask the Commission to take further measures to improve the quality of this data prior to the public notice announcing the opening of the LPFM filing window. Specifically, we ask the Commission to require all translator owners to update their records with the Commission using an electronic "non-form filing." We also ask the Commission to provide guidance on interpreting these records, and on what to do when data is missing or disputed.

1. Review of the translator input signal records

According to our initial review, more than a thousand translator records have missing, contradictory, or incomplete data. Of these, 968 records, over 7% of all translator records, list their delivery method as NULL, meaning "missing" or "not defined."[8] Unless this data exists elsewhere or the records are updated prior to the LPFM filing window, all LPFM applicants near these translators will need to determine the delivery method by calling the translator owner directly. Keeping in mind that each translator may have multiple LPFM applicants nearby, this missing data is likely to impact many LPFM applicants nationwide, as well as the many translator owners who will receive queries from them.

Another large area of concern found in the translator records was a set of more than 600 records with inconsistent data on the primary station being rebroadcast.[9] Without clear

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8   See Appendix p. 14.

9   See Appendix p. 14

information on the station being rebroadcast, LPFM applicants cannot determine whether their proposed facilities require a translator input interference showing nor can they complete one.

In the attached Appendix, we note several other categories of inconsistent and missing records. We also briefly examine translator authorization records, which the Commission has suggested as an alternative to CDBS, but these appear to contain the same missing and ambiguous data as the CDBS records themselves.[10] We also found that original authorizations were often unavailable and renewal authorizations had little content.

2. Measures to improve existing translator input data

In addition to our advocacy before the Commission, Prometheus Radio Project provides free services to LPFM stations and applicants, including application tools such as RFree, an open source allocations software program.[11] Our aim is to automate as much of the application process as possible, enabling community groups to apply with limited or no support from engineers or consultants. Nearly all the technical rules adopted in the *Sixth Report and Order* can be incorporated by RFree and other allocations tools. However, the usefulness of such software depends on the quality and availability of the data provided by the Commission.

Although applicants or their consultants may contact translator owners directly to clarify information that is contradictory or absent, this creates an extra burden on community groups and on translator owners. This more complex application process will also likely lead to more mistakes. Furthermore, translator owners may not respond promptly or at all. We are concerned

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10   See Appendix p. 16

11   See radiospark.org/rfree

that LPFM stations which have tried to comply in good faith will nonetheless be at risk of being

shut down because of bad data. Even if this is unlikely, LPFM applicants could waste hours (or

hundreds of dollars in engineering consultations) attempting to determine whether their proposed

station will comply with translator input interference rules.

Given the extent of the problems with this data, we ask the Commission to take further

measures to improve the data prior to the public notice announcing the opening of the LPFM

filing window. We ask the Commission to require all translator owners to submit a "non-form"

electronic filing to notify the Commission of changes, corrections, or omissions of translator

input data. This would be similar to the "non-form" filings used for change of address, Special

Temporary Authority, and other circumstances. Currently, changes to translator input data are

handled via correspondence with Commission staff. In comparison to updating all records via

correspondence, the proposed procedure would take relatively little staff time once implemented.

We advise that the impermanence of callsigns be taken into account in designing this form.

3. Need for guidance on translator input interference exhibits

We note that the ambiguity present in this data means that applicants will be faced with a

variety of conditions when preparing translator input interference exhibits.

Some of these conditions will likely include:

1. CDBS translator input data for the translator appear consistent and unambiguous

2. CDBS translator input data are questionable or missing, and the translator operator does
    not reply to inquiries from the LPFM applicant

3. CDBS translator input data conflicts with data obtained from translator operator or
    applicant

4. CDBS translator input data may be missing, but there is only one possible input frequency because there are no other translators nearby

5. CDBS translator input data may be missing, and there is at least one additional translator for the shared primary station

6. CDBS shows that the translator is colocated with its primary station (for example, where the translator is rebroadcasting the primary's HD2 channel) and therefore the translator input is already protected unless the LPFM is also co-located at the same facility

We ask the Commission to consider these conditions when providing guidance on a sufficient showing for translator input exhibits. Such guidance would enable LPFM applicants, consultants, and those creating software to proceed with greater confidence.

II. Protection of LPFM stations using directional antennas by other LPFM stations

The Commission has required FM translator modification applications and applications for new FM translators to treat LPFM stations operating at lower power or directional antennas as operating with non-directional antennas as their authorized power.[12] We ask for clarification on whether this standard would also apply to future LPFM applications or modifications.

III. Conclusion

We thank the Commission for the steps to date in implementing the Local Community Radio Act and the efforts towards a timely LPFM filing window. We look forward to our continuing work with the Commission to ensure that the filing process is as accessible as possible for community groups.

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12   *Sixth Report and Order*, ¶ 80

Appendix

CDBS Translator Input Data Investigation

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The Consolidated Database System (CDBS) is a database of radio stations, publicly available from the FCC. This is a short study of some of the CDBS translator input data undertaken with the goal of determining how well LPFM applicants and application engineering software can apply the proposed protection methods. The study was conducted on Nov 14, 2012 and again Feb 4, 2013. CDBS data from both dates were substantially similar, and the more recent data is referred to below.

This study estimates how many translators may have confusing, contradictory, or missing data, causing difficulty for applicants and application engineering software The author of this study is a developer of RFree, free open source engineering software designed for use in the upcoming LPFM filing window.[13]

Study Details

Translator input protection methods proposed for LPFM applicants require knowing which translators are receiving their signal in band, and of those, the source of the translator's input signal. This is true for both of the methods for demonstrating a lack of predicted interference.

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13   The beta version of RFree can be found at radiospark.org/rfree.

The key information in CDBS seems to reside in the int_translator table plus the facility.assoc_facility_id field, and the facility and fm_eng_data tables generally. This study examines the records in these fields to determine whether LPFM applicants will have the data necessary to comply with these new guidelines.

Int_translator records

Every current, not-dismissed or denied US translator found in fm_eng_data should have a corresponding record in int_translator. Only three do not. They are:

application_id	facility_id	fac_callsign	fm_dom_status	station_class
71238	67682	K282AA	LIC	D
1082067	166220	WCRT-FM1	STA	D
1081503	166241	WJNT-FM1	STA	D

Due to this missing data, designers of translator input protection software may wish to give warnings to any applicant suggesting a location within 10km of each of these translators on any channel (except possibly the channel of the translator output itself). Note the STAs may have expired (not investigated).

Three missing translator records do not present much of a problem.

Translator delivery_method fields

Of the current, US, non-dismissed/denied translators which have records in int_translators, applicants (and LPFM applicant-support software) need to know which are receiving their input in-band. The apparent way to determine this is via the int_translators.delivery_method field (for which detailed public documentation does not seem to

exist). The following values appear in this field. We include our educated assumptions as to their

meaning:

D = Direct. The translator input is the in-band (also called "off air") output signal of the primary transmitter of a full power station

V = Via. The translator input is the output of another translator whose callsign is in the primary_via field.

M, O, S = Microwave, Other, Satellite. The translator input signal is not delivered off air and thus does not require protection

NULL, or missing. There is no documented explanation of this field. LPFM application software should probably assume the worst and warn applicants within 10km of any such translator.

If the above assumptions are true, "D," "V," and NULL represent those translators which

must be considered for input signal protection.

<table>
<tr><th colspan="10">CDBS Feb 4, 2013</th></tr>
<tr><th>count(*)</th><th>%</th><th>delivery_method</th><th>via_W222XX</th><th>p_fac_id</th><th>p_self</th><th>a_self</th><th>a!=p</th><th>pf/FX</th><th>af/FX</th></tr>
<tr><td>950</td><td>7.3</td><td>NULL</td><td>52</td><td>20</td><td>0</td><td>0</td><td>2</td><td>0</td><td>1</td></tr>
<tr><td>9187</td><td>70.4</td><td>D</td><td>82</td><td>6716</td><td>2</td><td>4</td><td>356</td><td>53</td><td>108</td></tr>
<tr><td>513</td><td>3.9</td><td>M</td><td>0</td><td>267</td><td>0</td><td>0</td><td>8</td><td>0</td><td>0</td></tr>
<tr><td>793</td><td>6.1</td><td>O</td><td>50</td><td>325</td><td>0</td><td>0</td><td>18</td><td>0</td><td>0</td></tr>
<tr><td>949</td><td>7.3</td><td>S</td><td>0</td><td>537</td><td>0</td><td>1</td><td>38</td><td>0</td><td>1</td></tr>
<tr><td>646</td><td>5.0</td><td>V</td><td>610</td><td>444</td><td>0</td><td>1</td><td>20</td><td>0</td><td>2</td></tr>
</table>

<table>
<tr><th colspan="8">CDBS Nov 14, 2012</th></tr>
<tr><th>count(*)</th><th>%</th><th>delivery_method</th><th>via_W222XX</th><th>p_fac_id</th><th>p_self</th><th>a_self</th><th>a=p</th></tr>
<tr><td>968</td><td>7.4</td><td>NULL</td><td>47</td><td>21</td><td>0</td><td>0</td><td>18</td></tr>
<tr><td>9294</td><td>70.7</td><td>D</td><td>82</td><td>6814</td><td>2</td><td>4</td><td>6456</td></tr>
<tr><td>504</td><td>3.8</td><td>M</td><td>0</td><td>266</td><td>0</td><td>0</td><td>259</td></tr>
<tr><td>768</td><td>5.8</td><td>O</td><td>52</td><td>308</td><td>0</td><td>1</td><td>295</td></tr>
<tr><td>958</td><td>7.3</td><td>S</td><td>0</td><td>560</td><td>0</td><td>1</td><td>524</td></tr>
<tr><td>656</td><td>5.0</td><td>V</td><td>619</td><td>450</td><td>0</td><td>1</td><td>430</td></tr>
</table>

The first three columns in these tables give a breakdown of the distribution of translator delivery methods. For example 9,187 translators, or 70.4 percent of the total, have a delivery method of "D." 950 records, over 7% of all translator records, have a delivery method of NULL, which in database terms means "missing" or "not defined." Unless this data exists elsewhere or is updated prior to the LPFM filing window, applicants within 10km should probably be advised that they will need to contact the translator owner and prepare an exhibit for their application. 950 is a sufficiently-high number that it is likely to impact many LPFM applicants as well as many translator owners who will receive queries from these applicants.

The "via_W222XX" column counts how many translators with the given delivery method also have text in the primary_via field which appears to be a legitimate translator callsign. Nearly all of the 646 V=Via translators have what appear to be translator callsigns in primary_via, as would be expected if the assumption about "V" is true. The remaining 36 have widely-varying non-callsign text such as "Telco," "internet," "POTS line." It seems that these should be coded as O=Other rather than V=Via. These 36 translators' input signals may not need protection. However, without official guidance it seems reckless to assume that all V=Via translators without translator callsign text in primary_via need no third-adjacent input protection.

There are 135 V=Via translators with translator callsigns in the primary_via field whose callsigns are not present in the facility table (see Supplement 2). Therefore, the input to these translators is unknown. A possible explanation is that those translators are in the middle of channel changes, thus their callsigns are multiple or the callsign which should match primary_via is not facility.fac_callsign.

82 D=Direct translators also have translator callsigns in the primary_via field. Since it does not seem likely that the translator is taking input from both the main station and from another translator, these 82 are suspect. It is possible that these should actually be coded as V=Via. Non-callsign values of primary_via for these translators vary, though "DIRECT" is the most frequent value.

The int_translator table's prim_facility_id column apparently refers to a "primary" facility for the translator, however, it is not clear whether in the case of a V=Via translator this field refers to the full-power originating station or the upstream translator. Prim_facility_id is not fully populated in the int_translator table, as shown by the "p_fac_id" column. Roughly 2/3 of the D=Direct and V=Via entries are populated. A similar column, facility.assoc_facility_id, is fully populated, and seems more likely to refer to the originating full-power station being repeated. It is unclear whether, wWhen both prim_facility_id and assoc_facility_id are present, it is unclear which one takes precedence.

Columns "pf/FX" and "af/FX" count how many of the facilities referred to by int_translator.prim_facility_id or facility.assoc_facility_id, respectively, refer to facilities classified in CDBS as translators or boosters. If the intent of prim_facility_id is to refer to upstream translators, the V=Via translators' prim_facility_id should refer predominantly to translators. However, none do. A very small number of V=Via assoc_facility_ids refer to translators, suggesting as with D=Direct, that this field is either ambiguously defined or infrequently miscoded.

More troubling is that an appreciable number of D=Direct translators refer to primary/ associated facilities which are in fact translators, casting suspicion on these records and the consistent use of these fields generally.

For D=Direct translators, it would seem that the potential ambiguity in the meaning of prim_facility_id would be moot, and thus it should always have the same value as facility.assoc_facility_id. The "a!=p" column counts how many times this is untrue. For 356 D=Direct translators, the two IDs do not match. This casts suspicion on the actual input to these translators. An uninvestigated but plausible explanation for the 356 is that there are several records for many stations -- a record for the licensed station as well as records for pending applications and for various changes. It is therefore possible that the prim_facility_id for a translator could refer to a different record of the same station than the assoc_facility_id, and what appears to be suspicious in this analysis actually is not. Prior to resolution, perhaps these translators should be treated with suspicion, and the 20 such possibly-innocuous inconsistencies among the V=Via translators also deserve research.

Two more columns in the table above, "p_self" and "a_self," refer respectively to the handful of translators for which facility_id=prim_facility_id or facility_id=assoc_facility_id -- which would appear to mean that the translator retransmits itself! There may be some more subtle definition within CDBS to account for these situations, but for now they are suspect. One such station was examined, and appeared to be a very-distant translator for an NCE station, and looked more likely to be a satellite-fed translator.

Translators with delivery methods M, O, and S were not researched. However, the question was raised in the discussion above whether some miscoding errors are present in D and

V translators and whether every missing/NULL delivery_method is effectively miscoded from a translator input-protection standpoint. So it is reasonable to ask whether some of the M-O-S translators may be miscoded and may actually need input protection.

The field int_translator.trans_input_channel was not investigated beyond noting it is frequently empty. It is insufficient to accomplish LPFM translator input protection due to the need to establish the upstream station's signal strength at the translator, and therefore the upstream station itself (azimuth, power, distance, etc) must be known and that includes its output frequency. If it were populated and reliable, this field would at least allow a very reliable guess among the possible upstream stations for a particular translator.

Several uninvestigated avenues are noted above, and translators with confusing input data are counted, but not discussed. If those investigations and lists are of interest, please ask.

Quality of Translator Authorization Data

In response to concerns from Prometheus regarding the adequacy of translator input data in CDBS, the Commission suggests that sufficient translator input data are available from translator authorizations. We attempted to obtain authorizations for a small but arbitrary sample of translators from the FCC website (K273BT, K267AZ, K280AO, K280AW, K296BF, K228AG, K280AZ, K288BK). We found that original authorizations were often unavailable and renewal authorizations had little content. For a station whose primary_via callsign was not available in CDBS, the authorization reflected the same missing callsign. Where delivery_method was missing/NULL, the authorization supplied no additional information. These results, although limited to a small sample, suggest that translator input data may not be not any better in the authorizations than in CDBS.

Conclusion

If the assumptions here are correct, this brief examination of CDBS translator input data reveals missing or ambiguous data in the records for a significant number of translators -- at least 1000. LPFM applicants within 10km of each of these translators will likely need to contact translator owners, and in some cases translator applicants, to replace or clarify missing or confusing CDBS data. Translator operators/applicants may expect at least one contact per applicant, representing a significant burden on translator applicants and operators as well as LPFM applicants. If a translator owner or applicant does not cooperate in good faith, the path forward for LPFM applicants is murky.

If miscodings of the translator input delivery method prove to be significant, prudent LPFM applicants may be advised to independently verify all data for all translators, even translators with apparently consistent CDBS data, within 10km of their application's location. This would exacerbate the aforementioned burden considerably.

LPFM applicants and software providers would benefit from an official description of the meanings and relationships of the translator input portions of CDBS, especially to illuminate the potential issues raised here.

More helpful would be updated, accurate translator input signal data. Given the scope of the discrepancies and omissions found, a requirement for translator owners to update their records with the Commission would improve both services and reduce future interference complaints and disputes.

Even if data are improved and an official description improves clarity, applicants attempting to protect translators are likely to face incomplete or ambiguous translator input data and a variety of responses from queried translator owners and applicants. Consequently the Commission is likely to receive a wide variety of exhibits from LPFM applicants and may wish to consider guidance to limit applicant error, guide guide applicant-support software providers where to invest in automation, and reduce the Commission's application processing overhead.

Supplement 1 -- SQL Queries

The study above was performed on a MYSQL database containing an imported version of CDBS data. Errors could have been introduced through the importation process. Furthermore, the assumptions made in this study, like those made by other users of CDBS, may be incorrect. The assumptions made here are therefore documented below with the SQL queries used to produce the data above. With simple modifications, this SQL should run against other databases, for example the FCC's master CDBS.

```
USE cdbs;


drop table if exists fxid;

create temporary table fxid (id INT NOT NULL, primary key (id));

-- save every current translator ID from fm_eng_data into fxid
insert into fxid
select e.application_id
    from fm_eng_data as e
    join facility as f on e.facility_id = f.facility_id
    where
        asd_service in ('FX', 'FB')
        and eng_record_type = 'C'
        and fac_country = 'US'
    ;

-- remove from consideration translators whose applications are denied,
-- dismissed, license-cancelled, and old-style D-callsign deleted records
```

```sql
delete fxid from fxid
    join fm_eng_data as e on e.application_id = fxid.id
    join facility as f on e.facility_id = f.facility_id
    LEFT JOIN app_tracking AS at ON at.application_id = e.application_id
    WHERE at.app_status IN ('APDEN', 'APDIS', 'LICAN')
    OR fac_callsign like 'D%'
    ;


-- translators in fm_eng_data with no corresponding int_translator record
select e.application_id, e.facility_id, fac_callsign, fm_dom_status, station_class
    from fxid join fm_eng_data as e on e.application_id = fxid.id
    join facility as f on e.facility_id = f.facility_id
    left join int_translator as it on it.application_id = e.application_id
    LEFT JOIN cdbs.app_tracking AS at ON at.application_id = e.application_id
    where
        it.application_id is null
    order by fac_callsign
    ;

-- total translators considered
set @fxtotal = (select count(*) from fxid);

-- delivery method analysis
select count(*), round(100 * count(*) / @fxtotal, 1) as '%', delivery_method,
    SUM(
        IF(
            primary_via is not null
            and (primary_via like 'K2%' or primary_via like 'W2%' or primary_via like '%300%')
        ,1,0)
    ) as via_W222XX,
    SUM(if(prim_facility_id is not null, 1, 0)) as p_fac_id,
    SUM(if(prim_facility_id = e.facility_id, 1, 0)) as p_self,
    SUM(if(f.facility_id = f.assoc_facility_id, 1, 0)) as a_self,
    sum(
        if(
            prim_facility_id is not null
                and prim_facility_id != f.assoc_facility_id,
        1, 0)
    ) as 'a!=p',
    sum(
        if(
            prim_facility_id is not null and pf.fac_service in ('FX', 'FB'),
        1, 0)
    ) as 'pf/FX',
    sum(
        if(
            f.assoc_facility_id is not null and af.fac_service in ('FX', 'FB'),
        1, 0)
    ) as 'af/FX'
    -- ,
    -- sum(if(trans_input_channel is not null, 1, 0)) as t_i_chan
        from fxid join fm_eng_data as e on e.application_id = fxid.id
        join facility as f on e.facility_id = f.facility_id
```

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```
join int_translator as it on it.application_id = e.application_id
left join facility as pf on it.prim_facility_id = pf.facility_id
left join facility as af on f.assoc_facility_id = af.facility_id
where
    1
group by delivery_method
;
```

Supplement 2 -- V=Via Translators, missing callsigns

Translators with delivery_method=V, valid-looking translator callsign in primary_via, but that callsign not present in facility table. SQL follows data.

facility_id	fac_callsign	x	delivery_method	primary_via	prim_facility_id	assoc_facility_id
12331	K300AE	LIC–FX–D	V	K218DM	79246	79246
12358	K273BT	LIC–FX–D	V	K205CH	NULL	79246
18272	K267AZ	LIC–FX–D	V	K210AJ	12341	12341
18340	K258AO	LIC–FX–D	V	K215BG	4279	18344
20504	K210DU	LIC–FX–D	V	K292EJ	20528	20528
43622	K261CM	LIC–FX–D	V	K208BG	82446	82446
50594	K220DA	LIC–FX–D	V	K218BC	50608	50608
58436	W258AE	LIC–FX–D	V	W201BG	91932	91932
69208	K219KR	LIC–FX–D	V	K211CP	69171	69171
71821	K213BF	LIC–FX–D	V	K203BJ	71818	71818
71986	K249AQ	LIC–FX–D	V	K201DF	NULL	8414
72432	K271BG	LIC–FX–D	V	K276EN	NULL	39464
82400	K215CF	APP–FX–D	V	K205ES	69597	69597
84015	W271AG	LIC–FX–D	V	W293AG	24688	24688
85900	K210EM	CP–FX–D	V	K201DE	71818	71818
86398	K259AK	LIC–FX–D	V	K292EX	NULL	8414
86890	W211BU	LIC–FX–D	V	W219AK	NULL	66435
87067	K231AM	LIC–FX–D	V	K216ET	8414	8414
87701	W274AK	LIC–FX–D	V	W287AL	2468	2468
88131	K260AK	LIC–FX–D	V	K205EA	NULL	8414
88872	K273AW	NULL	V	K206DC	8414	8414
90377	K202CX	LIC–FX–D	V	K283AC	18344	18344
91774	K216EF	LIC–FX–D	V	K228DS	10791	10791
92367	K252DL	APP–FX–D	V	K203BT	8414	8414
92367	K252DL	LIC–FX–D	V	K203BT	8414	8414
93694	K257DT	LIC–FX–D	V	K220IG	51183	51183
122758	W206BH	LIC–FX–D	V	W201CB	66429	66429
138588	NEW	APP–FX–D	V	W243AL	8414	8414
138590	W236AL	LIC–FX–D	V	K219CW	8414	8414

138592	NEW	APP–FX–D	V	W243AL	8414	8414
138630	NEW	APP–FX–D	V	K205DD	8414	8414
138647	NEW	APP–FX–D	V	W220BT	8414	8414
138677	NEW	APP–FX–D	V	K215EE	8414	8414
138693	NEW	APP–FX–D	V	W218BY	8414	8414
138712	NEW	APP–FX–D	V	W260AB	41094	41094
138775	NEW	APP–FX–D	V	W271AD	18852	86560
138777	NEW	APP–FX–D	V	W271AD	18852	18852
138819	NEW	APP–FX–D	V	K264AI	8432	8432
138823	NEW	APP–FX–D	V	K264AI	8432	8432
138827	NEW	APP–FX–D	V	K264AI	8432	8432
138828	NEW	APP–FX–D	V	K264AI	8432	8432
138832	NEW	APP–FX–D	V	K264AI	8432	8432
138836	K298BH	LIC–FX–D	V	K216EW	NULL	8432
138955	NEW	APP–FX–D	V	W212BT	79246	79246
138967	W290BA	LIC–FX–D	V	W212BT	NULL	78441
138974	W221BG	LIC–FX–D	V	W212BT	NULL	79246
139035	NEW	APP–FX–D	V	W212BT	79246	79246
139059	NEW	APP–FX–D	V	K208DO	8414	8414
139060	K281BB	LIC–FX–D	V	K208DO	8414	8414
139383	NEW	APP–FX–D	V	K267AE	8432	8432
139416	K259AU	LIC–FX–D	V	K207DN	8414	8414
139422	K277AT	LIC–FX–D	V	K240CU	NULL	49348
139427	NEW	APP–FX–D	V	K207DN	8414	8414
139544	NEW	APP–FX–D	V	K203BT	8414	8414
139600	NEW	APP–FX–D	V	K208CY	79246	79246
139845	NEW	APP–FX–D	V	K208CY	79246	79246
139924	W245AH	LIC–FX–D	V	W273AH	NULL	8414
139995	NEW	APP–FX–D	V	K206DC	8414	8414
140058	NEW	APP–FX–D	V	W209BE	79246	79246
140058	NEW	APP–FX–D	V	W212BT	79246	79246
140107	NEW	APP–FX–D	V	K208CY	79246	79246
140267	K237CY	LIC–FX–D	V	K221EQ	18796	9761
140272	K297AK	LIC–FX–D	V	K215ER	NULL	84104
140465	NEW	APP–FX–D	V	K216FH	8432	8432
140469	NEW	APP–FX–D	V	K220IH	18801	18801
140540	NEW	APP–FX–D	V	K205DN	79246	79246
140594	NEW	APP–FX–D	V	W218BJ	79246	79246
140616	NEW	APP–FX–D	V	W218BJ	79246	79246
140661	NEW	APP–FX–D	V	W213AZ	78377	78377

140690	NEW	APP-FX-D	V	K208CN	71417	49348
140726	NEW	APP-FX-D	V	W220BT	8414	8414
140730	NEW	APP-FX-D	V	W220BT	8414	8414
140732	NEW	APP-FX-D	V	W220BT	8414	8414
141218	NEW	APP-FX-D	V	K213BT	79246	79246
141256	K275AW	LIC-FX-D	V	K285EV	NULL	4079
141669	NEW	APP-FX-D	V	K217ET	79246	79246
141684	NEW	APP-FX-D	V	K217ET	79246	79246
141766	K247AN	LIC-FX-D	V	K204EZ	71810	71810
141915	W264AZ	LIC-FX-D	V	W280DL	NULL	126761
142345	K262AO	LIC-FX-D	V	K214DM	NULL	8414
142449	NEW	APP-FX-D	V	W201AK	65515	65515
142499	NEW	APP-FX-D	V	K214DX	8414	8414
142663	NEW	APP-FX-D	V	K205DD	8414	8414
142667	NEW	APP-FX-D	V	K205DD	8414	8414
142672	NEW	APP-FX-D	V	K205DD	8414	8414
142677	NEW	APP-FX-D	V	K205DD	8414	8414
142682	NEW	APP-FX-D	V	K205DD	8414	8414
142686	NEW	APP-FX-D	V	K205DD	8414	8414
142689	NEW	APP-FX-D	V	K205DD	8414	8414
143008	NEW	APP-FX-D	V	K207DO	8414	8414
143019	K228DU	LIC-FX-D	V	K207DO	8414	8414
143027	NEW	APP-FX-D	V	K207DO	8414	8414
143032	NEW	APP-FX-D	V	K204EP	8414	8414
143102	NEW	APP-FX-D	V	K204DD	79246	79246
143131	NEW	APP-FX-D	V	K201GB	79246	79246
143668	NEW	APP-FX-D	V	K272DC	2749	2749
143674	NEW	APP-FX-D	V	K213BT	79246	79246
143759	NEW	APP-FX-D	V	W213AV	79246	79246
143785	NEW	APP-FX-D	V	W213AZ	79246	79246
144708	NEW	APP-FX-D	V	W213AZ	78377	78377
144754	NEW	APP-FX-D	V	W201CR	90341	90341
145579	K295AY	LIC-FX-D	V	K213DC	NULL	122306
146283	K232EC	LIC-FX-D	V	K285FV	NULL	164307
146876	NEW	APP-FX-D	V	W201AK	65515	65515
147937	K248BB	LIC-FX-D	V	K261DN	NULL	91030
148242	NEW	APP-FX-D	V	K211DJ	79246	79246
148386	K296FQ	LIC-FX-D	V	K258BL	NULL	66441
150149	K225AX	CP-FX-D	V	K294BG	134721	134721
150415	W286AY	LIC-FX-D	V	W212CJ	NULL	6634

150416	NEW	APP–FX–D	V		K257EN	12512	12512
151352	W284AV	NULL	V		W273BR	93423	36169
151809	K234AW	LIC–FX–D	V		K219LE	NULL	60852
152721	W289BD	LIC–FX–D	V		W281AE	NULL	4841
152955	K264AV	LIC–FX–D	V		K211EU	NULL	8414
152966	W242AZ	LIC–FX–D	V		W209AZ	66435	66435
153015	W269BR	LIC–FX–D	V		W209AZ	66435	66435
153067	W271AW	LIC–FX–D	V		W209AZ	66435	66428
153190	W211CA	LIC–FX–D	V		W219DA	NULL	18425
153644	K279AT	LIC–FX–D	V		K255B0	NULL	93643
155477	K268BF	LIC–FX–D	V		W227AZ	NULL	123332
156067	NEW	APP–FX–D	V		W212BT	79246	79246
156081	W271AJ	LIC–FX–D	V		W289AN	NULL	1303
156138	NEW	APP–FX–D	V		K205DS	63464	63464
156149	NEW	APP–FX–D	V		K205DS	63464	63464
156205	NEW	APP–FX–D	V		K202BR	63464	63464
156296	NEW	APP–FX–D	V		W219BT	79246	79246
156314	NEW	APP–FX–D	V		W219BT	79246	79246
156375	NEW	APP–FX–D	V		K213EB	55768	55768
156498	K272EG	LIC–FX–D	V		K211CS	69171	69171
156741	NEW	APP–FX–D	V		K202BR	63464	63464
156756	NEW	APP–FX–D	V		K202BR	63464	63464
157109	K289AO	LIC–FX–D	V		K203CU	8414	8414
157410	NEW	APP–FX–D	V		W218BY	8414	8414
157437	NEW	APP–FX–D	V		W218BY	8414	8414

```
alter table cdbs.int_translator add index index1 (primary_via);
alter table cdbs.facility add index index1 (fac_callsign);

-- delivery_method=V with primary_via K2* W2* *300* but callsign not found
select f.facility_id, f.fac_callsign,
     concat(e.fm_dom_status, '-', e.asd_service, '-', e.station_class) as x,
     it.delivery_method,
         it.primary_via, it.prim_facility_id,
         f.assoc_facility_id,
         it.trans_input_channel,
         vf.facility_id
     from fxid join fm_eng_data as e on e.application_id = fxid.id
     join facility as f on e.facility_id = f.facility_id
     join int_translator as it on it.application_id = e.application_id
     left join facility as vf on vf.fac_callsign = primary_via
     where
        it.delivery_method = 'V'
```

and (primary_via like 'W2%' or primary_via like 'K2%' or primary_via like '%300%')
            and vf.facility_id is null
            order by f.facility_id
        ;

alter table cdbs.int_translator drop index index1;
alter table cdbs.facility drop index index1;

Supplement 3 -- the int_translator table in MySQL

```
+---------------------+-------------+------+-----+---------+-------+
| Field               | Type        | Null | Key | Default | Extra |
+---------------------+-------------+------+-----+---------+-------+
| application_id      | int(11)     | NO   | PRI | NULL    |       |
| delivery_method     | char(1)     | YES  |     | NULL    |       |
| prim_callsign       | char(12)    | YES  |     | NULL    |       |
| prim_comm_city      | varchar(20) | YES  |     | NULL    |       |
| prim_comm_state     | char(2)     | YES  |     | NULL    |       |
| prim_sta_out_channel| int(11)     | YES  |     | NULL    |       |
| primary_via         | varchar(13) | YES  |     | NULL    |       |
| scnd_comm_city      | varchar(20) | YES  |     | NULL    |       |
| scnd_comm_state     | char(2)     | YES  |     | NULL    |       |
| third_comm_city     | varchar(20) | YES  |     | NULL    |       |
| third_comm_state    | char(2)     | YES  |     | NULL    |       |
| trans_input_channel | int(11)     | YES  |     | NULL    |       |
| prim_facility_id    | int(11)     | YES  | MUL | NULL    |       |
| last_change_date    | date        | YES  |     | NULL    |       |
+---------------------+-------------+------+-----+---------+-------+
```

Supplement 4 -- the facility table in MySQL

```
+---------------------+-------------+------+-----+---------+-------+
| Field               | Type        | Null | Key | Default | Extra |
+---------------------+-------------+------+-----+---------+-------+
| comm_city           | varchar(20) | YES  |     | NULL    |       |
| comm_state          | char(2)     | YES  |     | NULL    |       |
| eeo_rpt_ind         | char(1)     | YES  |     | NULL    |       |
| fac_address1        | varchar(40) | YES  |     | NULL    |       |
| fac_address2        | varchar(40) | YES  |     | NULL    |       |
| fac_callsign        | char(12)    | YES  |     | NULL    |       |
| fac_channel         | int(11)     | YES  |     | NULL    |       |
| fac_city            | varchar(20) | YES  |     | NULL    |       |
| fac_country         | char(2)     | YES  |     | NULL    |       |
| fac_frequency       | float       | YES  |     | NULL    |       |
| fac_service         | char(2)     | YES  |     | NULL    |       |
| fac_state           | char(2)     | YES  |     | NULL    |       |
| fac_status_date     | date        | YES  |     | NULL    |       |
| fac_type            | varchar(3)  | YES  |     | NULL    |       |
| facility_id         | int(11)     | NO   | PRI | NULL    |       |
| lic_expiration_date | date        | YES  |     | NULL    |       |
| fac_status          | varchar(5)  | YES  |     | NULL    |       |
| fac_zip1            | char(5)     | YES  |     | NULL    |       |
| fac_zip2            | char(4)     | YES  |     | NULL    |       |
```

```
| station_type      | char(1)      | YES |     | NULL    |      |
| assoc_facility_id | int(11)      | YES |     | NULL    |      |
| callsign_eff_date | date         | YES |     | NULL    |      |
| tsid_ntsc         | int(11)      | YES |     | NULL    |      |
| tsid_dtv          | int(11)      | YES |     | NULL    |      |
| digital_status    | char(1)      | YES |     | NULL    |      |
| sat_tv            | char(1)      | YES |     | NULL    |      |
| network_affil     | varchar(100) | YES |     | NULL    |      |
| nielsen_dma       | varchar(60)  | YES |     | NULL    |      |
| tv_virtual_channel| int(11)      | YES |     | NULL    |      |
| last_change_date  | date         | YES |     | NULL    |      |
+-------------------+--------------+------+-----+---------+------+
```

Supplement 5 -- the fm_eng_data in MySQL

```
+-----------------------+-------------+------+-----+---------+------+
| Field                 | Type        | Null | Key | Default | Extra |
+-----------------------+-------------+------+-----+---------+------+
| ant_input_pwr         | float       | YES  |     | NULL    |      |
| ant_max_pwr_gain      | float       | YES  |     | NULL    |      |
| ant_polarization      | char(1)     | YES  |     | NULL    |      |
| ant_rotation          | float       | YES  |     | NULL    |      |
| antenna_id            | int(11)     | YES  |     | NULL    |      |
| antenna_type          | char(1)     | YES  |     | NULL    |      |
| application_id        | int(11)     | NO   | PRI | NULL    |      |
| asd_service           | char(2)     | YES  |     | NULL    |      |
| asrn_na_ind           | char(1)     | YES  |     | NULL    |      |
| asrn                  | int(11)     | YES  |     | NULL    |      |
| avg_horiz_pwr_gain    | float       | YES  |     | NULL    |      |
| biased_lat            | double      | YES  |     | NULL    |      |
| biased_long           | double      | YES  |     | NULL    |      |
| border_code           | char(1)     | YES  |     | NULL    |      |
| border_dist           | float       | YES  |     | NULL    |      |
| docket_num            | varchar(20) | YES  |     | NULL    |      |
| effective_erp         | float       | YES  |     | NULL    |      |
| elev_amsl             | float       | YES  |     | NULL    |      |
| elev_bldg_ag          | float       | YES  |     | NULL    |      |
| eng_record_type       | char(1)     | YES  |     | NULL    |      |
| facility_id           | int(11)     | NO   | MUL | NULL    |      |
| fm_dom_status         | varchar(6)  | YES  |     | NULL    |      |
| gain_area             | float       | YES  |     | NULL    |      |
| haat_horiz_rc_mtr     | float       | YES  |     | NULL    |      |
| haat_vert_rc_mtr      | float       | YES  |     | NULL    |      |
| hag_horiz_rc_mtr      | float       | YES  |     | NULL    |      |
| hag_overall_mtr       | float       | YES  |     | NULL    |      |
| hag_vert_rc_mtr       | float       | YES  |     | NULL    |      |
| horiz_bt_erp          | float       | YES  |     | NULL    |      |
| horiz_erp             | float       | YES  |     | NULL    |      |
| lat_deg               | decimal(2,0)| YES  | MUL | NULL    |      |
| lat_dir               | char(1)     | YES  |     | NULL    |      |
| lat_min               | decimal(2,0)| YES  |     | NULL    |      |
| lat_sec               | decimal(5,3)| YES  |     | NULL    |      |
| lon_deg               | decimal(3,0)| YES  |     | NULL    |      |
```

```
| lon_dir              | char(1)       | YES  |     | NULL    |       |
| lon_min              | decimal(2,0)  | YES  |     | NULL    |       |
| lon_sec              | decimal(5,3)  | YES  |     | NULL    |       |
| loss_area            | float         | YES  |     | NULL    |       |
| max_ant_pwr_gain     | float         | YES  |     | NULL    |       |
| max_haat             | float         | YES  |     | NULL    |       |
| max_horiz_erp        | float         | YES  |     | NULL    |       |
| max_vert_erp         | float         | YES  |     | NULL    |       |
| multiplexor_loss     | float         | YES  |     | NULL    |       |
| power_output_vis_kw  | float         | YES  |     | NULL    |       |
| predict_coverage_area| float         | YES  |     | NULL    |       |
| predict_pop          | int(11)       | YES  |     | NULL    |       |
| rcamsl_horiz_mtr     | float         | YES  |     | NULL    |       |
| rcamsl_vert_mtr      | float         | YES  |     | NULL    |       |
| station_class        | varchar(2)    | YES  |     | NULL    |       |
| terrain_data_src     | char(1)       | YES  |     | NULL    |       |
| vert_bt_erp          | float         | YES  |     | NULL    |       |
| vert_erp             | float         | YES  |     | NULL    |       |
| num_sections         | int(11)       | YES  |     | NULL    |       |
| present_area         | float         | YES  |     | NULL    |       |
| percent_change       | float         | YES  |     | NULL    |       |
| spacing              | float         | YES  |     | NULL    |       |
| terrain_data_src_other | varchar(255)| YES  |     | NULL    |       |
| trans_power_output   | float         | YES  |     | NULL    |       |
| mainkey              | char(16)      | YES  |     | NULL    |       |
| lat_whole_secs       | int(11)       | YES  |     | NULL    |       |
| lon_whole_secs       | int(11)       | YES  |     | NULL    |       |
| station_channel      | int(11)       | YES  |     | NULL    |       |
| lic_ant_make         | varchar(3)    | YES  |     | NULL    |       |
| lic_ant_model_num    | varchar(60)   | YES  |     | NULL    |       |
| min_horiz_erp        | float         | YES  |     | NULL    |       |
| haat_horiz_calc_ind  | char(1)       | YES  |     | NULL    |       |
| erp_w                | int(11)       | YES  |     | NULL    |       |
| trans_power_output_w | int(11)       | YES  |     | NULL    |       |
| market_group_num     | varchar(7)    | YES  |     | NULL    |       |
| last_change_date     | date          | YES  |     | NULL    |       |
+----------------------+-------------+------+-----+---------+-------+
```